INDIA RUBBER WORLD AND ELECTRICAL TRADES REVIEW

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Contributions: Of a technical nature suited to the purposes of this paper, will be liberally paid for if accepted. Correspondence relating to Rubber, Gutta Percha, Celluloid, Asbestos, etc., or any of their practical applications, is cordially invited, and the co-operation of all who make a study of these specialties either a pleasure or a duty is earnestly desired. All communications must bear the name of the writer solely as a guarantee of good faith.

Catalogues: Price Lists; Circulars; Reports of Meetings; early notices of changes in firms or corporations; views of factories, for office display; news items, particularly relating to new specialties; and local newspaper clippings (with endorsement of name and date of paper taken from), will be cheerfully received and fully acknowledged.

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The Situation in Brazil.

THE fair promise of stability and permanence which the new government in Brazil gave a month ago, has been fully justified. Every recent event, commercial as well as political, tends to prove that public sentiment is cordially in favor of republican institutions, that the people are ready for the change, and that the demand for the restoration of the monarchy is confined almost exclusively to the few who profited by the favor of the royalty. A notable and significant feature of the later news, is the number and character of monarchists of influence and prominence who have declared for the Republic, particularly among bankers and commercial men, whose material interests tend strongly to ally them with the party which promises stability. The industry and commerce of the country have, also, gone forward without interruption or noteworthy evidence of apprehension; the new government has proceeded smoothly in the full discharge of its every function, making rapid progress in supplanting enemies with friends in every branch of the service; and at home as well as abroad intelligent opinion seems to have hardened into the conviction that the Republic is a fact, and that it is certain to last, either in the hands of the party now in power or their duly elected successors. Meantime the aged Empress has sunken to her last repose beneath the weight of years and disappointments; and the cheery disposition and busy habits that have made Dom Pedro notable and lovable among monarchs, seem to have at last given place to that despondency which is a certain sign of hopelessness. He, too, must soon pass on to the end; and after he is gone, the succession passes to a daughter and a son-in-law who are strikingly deficient in every element of character and equipment necessary to leadership. The cause of monarchy seems, therefore, to be hopeless.

It is not unlikely, however, that the country will be periodically disturbed for some time to come. Royal hangers-on are loath to let go any opportunity to handle a people's purse-strings, be it willingly or unwillingly on the part of the victims. The present government is a military dictatorship purely, and the consummation of its plans depends ultimately upon a popular vote of the people. The royalists will, of course, resort to every means to stir up discontent previous to this event, and to render the vote indecisive when it is taken; and in all such work they will get more or less substantial aid from the beneficiaries of tottering thrones throughout Europe. In so far as they are successful, the peace and industrial prosperity of the country will suffer, at least from uncertainty. But not until open war takes the workers from the forests can there be any material interruption of the rubber industry; and so long as peaceful old Dom Pedro lasts and the national army maintains its present *esprit de corps*, war is practically out of the question.

American Rubber Machinery Abroad.

NOT long ago a large rubber factory in Russia, wishing to add the manufacture of rubber boots and shoes to their product, sent an agent to examine German, English and American machinery, with a view of securing the best. Besides his calls upon the manufacturers of machinery, he visited factories in the different countries named, and finally awarded the contract to the National Iron Works, of New Brunswick, N. J. This machinery could have been purchased cheaper in England. Indeed, besides the extra freight and the import duty of two and three-fourths cents per pound, the first cost of the American was a trifle more than the European. These differences in cost, however, were of little moment when the finish and effectiveness of the machinery were taken into account. The shipment, which weighed more than 60,000 lbs., consisted of one of Kelly's patent steam vulcanizers for boots and shoes; a four-roll calender; soling calenders, etc., etc.

IT is with sincere sorrow that we chronicle the death of Mr. H. S. Winans, of the Peerless Rubber Co. of New York. Mr. Winans had been in delicate health for some time, and finally caught a severe cold, which turning into pneumonia, resulted in his death. He was a man of sterling character and capacity, and behind him are left many friends to mourn his taking-off.

The Purchase of the Trenton Mills.

FOR two months past the Trenton world has been in a ferment over the knowledge that an English syndicate has been attempting to purchase the rubber mills. There has been a deal of secrecy observed in talking the matter over. The meetings of the manufacturers have been held with closed doors, and the hungry newspaper reporters have been ruthlessly excluded. From time to time, however, there have crept into the press, items about the approaching deal, and chief among these was the announcement of the presence of an English expert to examine the rubber mills and to go over the books with eagle eye and true British patience. The fact also that Mr. R. R. Whitehead and Mr. Thomas Bell went to England with the representative of English money, was duly chronicled with a variety of comments, most of which showed but little knowledge of the actual state of affairs. On the return of these gentlemen there was a rush of newspaper men to see them, and a resultant flood of items concerning their trip. One Trenton paper gravely published the statement that the journey had nothing to do with the purchase of the mills, but was for the purpose of purchasing crude rubber in Liverpool, by which means the Trenton factories would be saved some fifty thousand dollars per annum. This statement appeared very weak, when a new delegation of Trenton rubber men, accompanied by the ubiquitious expert, started again for England, and this time with a representative from four of the eight mills interested.

That the purchase is practically an assured fact, cannot now be doubted. It will, however, have but little outward effect upon the business done by these mills. The present proprietors will, if they so elect, be retained as managers. It is rumored that Hon. Frank Magowan will be offered the position of general manager of the whole aggregation. A statement that contradicts this is to the effect that Mr. Magowan's large interests in other manufacturing concerns are all that he cares to attend to, and that the place will be filled by Mr. Thos. Bell. The eight mills that are to form this English plant are: The Trenton Rubber Works, the Hamilton Rubber Co., the Star Rubber Co., Whitehead Bros., Brook, Oliphant & Co., the Mercer Rubber Co., the Home Rubber Co. and Murray, Whitehead & Murray.

According to the Trenton Board of Trade Report of 1889, the capital invested in rubber mills is $1,700,000. But, of course, the plants and the business of the eight mills are worth far more than this sum. It is probable that the whole deal will be consummated before the 20th of this month.

WITH this issue of THE INDIA RUBBER WORLD, Mr. P. F. Mottelay retires from its editorship, having sold his interest in the paper to Mr. H. C. Pearson, who is too well known to the rubber trade to require introduction at our hands. On the 20th inst. Mr. Mottelay will sail for Europe for a pleasure trip, with which will be combined some business matters, and while abroad he expects to visit the principal rubber factories of France and England. We hope to lay before our readers some interesting correspondence as the result of his observations.

What About Artificial Rubber?

IN these times when the chemical laboratory supplants the farmer in the production of such commodities as sugar, tea, alcohol, drugs and dye-stuffs, it is not improbable that soon many other products of nature will be supplied in a similar manner. The revolution in Brazil causes considerable anxiety about the future of Para rubber. Should this commodity reach the high price that is sometimes predicted, would not the American manufacturers have a right to expect that chemists should produce for them an artificial rubber equal in every way to Para? It has been often claimed that this has been done, and it is true that there are hundreds of excellent substitutes for india rubber in use to-day. But that none of them have approached india rubber in its general excellence cannot be denied. For example, counterfeit gums are to-day manufactured that have the same specific gravity as Para, and that vulcanize like it. These gums may be spread upon cloth and form a water-proof coating that is analagous to india rubber. A few of these gums are, indeed, superior to rubber in some respects. They are not injured by acids and oils, nor do they deteriorate in the sunlight, as does the finest Para. At the same time, in no one of them is found the peculiar elasticity that the Para gum has. Here, then, is the chance for the ambitious chemist. Perhaps he will find the solution of his problem in some of the vegetable oils now on the market, and perhaps not. But whenever he may discover the elements that, combined, will produce genuine caoutchouc, then will he have found a gold mine.

Of course, the chances are that the particular one who reads this article will not find what he is looking for. That he will experiment is altogether probable, and not unlikely he will think he has this illusive material, and will, perhaps, convince some of the sanguine that he has it, only to find after spending time and money that he has what somebody else has already thrown aside as worthless. Nevertheless, the day is coming when artificial rubber will be manufactured, and when the trade will no longer be dependent on the Indian rubber gatherer of the Amazon.

International Compliments.

A FEW months ago Mr. T. D. Lockwood read a paper before the American Institute of Electrical Engineers, entitled "Electrical Notes of a Transatlantic Trip." A month or so later Mr. G. L. Addenbrooke, who, by the way, was present at the reading of Mr. Lockwood's paper and contributed at great length to the discussion thereon, read a paper before the English Institution of Electrical Engineers on "Electrical Engineering in America." It is somewhat difficult, after a perusal of both these papers, to admit that either of them brings forth sufficient points of novelty or real interest to justify the expenditure of time by a large number of men in order to listen to it. Mr. Lockwood spent a few months in Europe, chiefly in England, and came back and told us that the British telegraph system is admirably organized, and the service cheap and expeditious; that the outdoor construction in England is infinitely superior to the generality of the same class of work over here, and that poles are not allowed in the streets of great cities; that central

stations for the distribution of electric light and power are scarce in England, and electric railroads scarcer still; that Mr. Preece has his residence well lighted by electricity, and Sir David Salamons has an excellently appointed laboratory, with a copy of the transactions of the American Institute of Electrical Engineers on the book-shelf. Most of this must have been well known to the members of the Institute before, and what little was not scarcely justified the calling of a meeting to hear it.

Mr. Addenbrooke, on the other hand, did not even spend a few months in this country as a qualification for preparing his paper; but, as in the course of his travels he took a flying trip across the continent from San Francisco to New York, he cast his eagle eye around and made a few notes preparatory to telling his colleagues beyond the seas all about "Electrical Engineering in America"! Fortunately for his hearers, Mr. Addenbrooke did not emulate Mr. Lockwood's somewhat strained attempts at being funny, but told his story in a straightforward fashion without any embellishments. However, what he really told amounts to very little. The principal note sounded was that out-door construction in this country is at a very low ebb indeed—in fact, Mr. Addenbrooke went so far as to say that during the course of his journey he did not see one ship-shape, neat-looking pole, which, certainly is painting the devil a little too black. Then the British electrical engineers heard a little about a few central stations, with a casual reference to a peculiar form of boiler; also, they were pathetically informed of Mr. Addenbrooke's sufferings through constantly being exposed to the blinding rays of arc lamps unprotected by frosted globes. A reference to the inconvenient situation of incandescent lamp-switches, another to the rough manufacture of arc and main switches generally, and a third to a special kind of hard insulating material for undergronnd wires, almost exhaust Mr. Addenbrooke's "points."

Now we ask, in the name of science, what earthly advantage did the American Institute gain by calling a meeting to hear Mr. Lockwood's trifling notes of a trip, no doubt much enjoyed by him, but of very little benefit to his coworkers? And what did Mr. Addenbrooke's fellow workers learn by listening to his hasty impressions gathered during a confessedly flying trip? If an Englishman were to spend a year or two over here doing practical work with American electricians, he would naturally acquire a store of information, and be able to draw fair comparisons, and would be in a position to prepare a useful and interesting paper; and the same might be done by an American who should pass a year or two working in England. But for an electrician to spend a month or two "globe trotting" on the other side and then come back and pour forth his "notes," or for another to rush across the continent, spending a week or two on American soil and then go to London and tell all about "electrical engineering in America," is an absurdity and a wanton waste of valuable time.

A SUBJECT which met enthusiastic approval at the last meeting of the Gossamer Manufacturers' Association was, "United action for the World's Fair of all the rubber interests."

New Goods in the Market.

TO MANUFACTURERS:

It shall be our aim to embody in this department descriptions and illustrations of all the latest novelties introduced in the market; to the end that jobbers, retailers and rubber goods buyers generally may look here for information as to every thing new that each month or season brings forth. Manufacturers are, therefore, most cordially invited to co-operate with us in making the department as complete and attractive as possible—the distinct understanding being that no charge whatsoever, either direct or indirect, will be made for these publications. Our reward will come through giving our readers valuable information; and that will be reward enough if manufacturers but co-operate with us in giving the information freely and in all cases at the earliest practicable moment.

In forwarding descriptions of new goods, be careful to write on one side of the paper only; be as brief as possible, but always write enough to give the buyer a clear idea of the article you offer; quote prices if practicable; give your full address, plainly written; and in all cases send a small illustration or wood cut if you have one.

—The Boston Belting Company have recently patented an improved system of putting together heavy seamless rubber belts, whereby they claim to overcome all the defects and objections to the systems heretofore in use. We are indebted to their courtesy for the following complete illustrations and descriptions: Fig. 1 represents a belt made from duck, with the usual frictioned rubber coating on both sides. The outer covering being butted as shown, and a light "seam" of pure rubber applied to hold together this butt joint, which is the weakest part to lateral strain, then the whole is vulcanized under pressure. This seam is more liable to abrade when applied to a butt joint of this kind of belting than to others, giving the belt an objectionable appearance, though doing but little practical harm. Fig. 2 represents the "regular" rubber belting with seam. The inside plies of this are made from frictioned

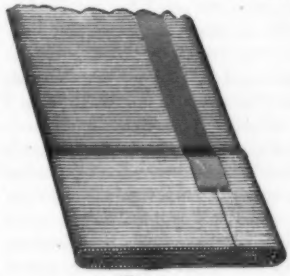


Fig. 1.

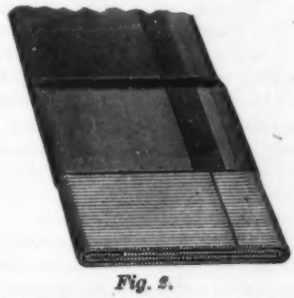


Fig. 2.

Fig. 3.

Fig. 4.

duck as before described, but the outside ply has received, on its outer surface, an extra coating of rubber applied by heated calender rollers, which is the best uniting process. This ply is then wrapped over the inner plies, butted as shown and the seam applied, then vulcanized under pressure. While this seam has a lateral tendency to open, it is more secure than Fig. 1. Fig. 3 represents "Seamless" rubber belting. It is made from frictioned duck with an outside covering folded around the frictioned center, passing over the butted joint, lapped as shown, and then vulcanized under pressure. The strength of this covering at the frictioned butt joint is no greater than Fig. 2. Fig. 4 represents a "Stitched Seamless" rubber belt. It is made the same as No. 3, except that previous to folding on the outer rubber covering it is stitched as shown. Figs. 5, 6, 7 and 8 represent our new patented method for making four to eight

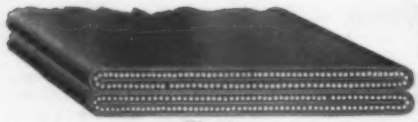


Fig. 5.

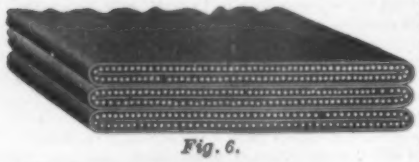


Fig. 6.

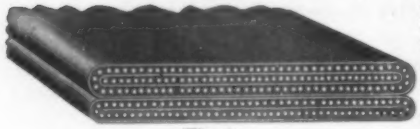


Fig. 7.

Fig. 8.

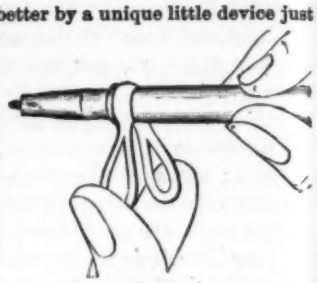
ply and thicker seamless belting. In making a "Regular" two-ply belt the duck is frictioned on both sides, then a heavy coating of rubber is applied to one side by means of heated calender rollers, making a perfect union. Thus prepared, strips are cut and folded, a seam of pure rubber applied for holding the butts together, then the whole is vulcanized. The use of heated calender rollers being the most perfect process for uniting the thicker rubber coating to the frictioned duck, it is used in making these patent belts. In making a four-ply belt (Fig. 5), we first make two 2-ply belts with the butt joints placed on opposite sides from the center of the belt, dispense with the seam strip and place the butted surfaces together, and vulcanize them under pressure, forming a four-ply. In making a six-ply belt (Fig. 6), we first make three 2-ply belts, dispensing with all seam strips, as each two-ply belt is a seam for its opposite two-ply, bringing the butt joint within the belt; then placing three such belts together, all are united by vulcanizing under pressure to form a six-ply belt. Fig. 7 represents a five-ply belt. Fig. 8 represents a six-ply made from two 3-ply. In this belt no butts or longitudinal seams can possibly be opened or found. All of the thick coating of rubber added to the first frictioned coating is applied under heavy heated calender rollers, which is not the case in any other "Seamless" belt. Belts of four-ply or more, by the new process, have a better union between duck and rubber, are perfectly flat as no seam strip is used, and it makes no difference, as in other belts, which side is run on the pulley. They will also bend more readily, having more and better applied rubber within and between the several plies than by the old processes.

—If any manufacturer could blow a bubble from glass the size of a playing ball, so strong that it could be thrown against any object and not break, so lively that it will bound like an india-rubber ball, so beautifully colored that it looks as if made from clouded amber and carnelian, how such a toy would sell. This is just what the Celluloid Novelty Company have succeeded in doing, using celluloid in the place of glass. They have produced the lightest and prettiest toy ball that it has been our privilege to see. The first day's sales of these goods were 295 dozen, and still the call continues. They put them up in dozen boxes, each one of the boxes containing a dozen, and each one being of different color, or rather a combination of colors, and all of them being artistically beautiful. For a moment it gives us a shock to throw so fragile a thing on the floor, but when it bounds high in the air, the fear is changed to wonder and admiration.

—Within a few days we had the pleasure of riding with one of the officers of the Rubber and Cushioned Tire Company, of Philadelphia, in a carriage fitted with their steel-shod rubber tires. The ride was from North Penn Junction to Philadelphia proper, on the most horrible cobble-stone pavement that it is the luck of any city to possess, and yet the jar and rattle that one would expect in such a ride was reduced to a minimum by the cushioned tires. The company already has orders from all parts of the Union for fitting a variety of vehicles with these goods, and the project is an assured success.

—One of the prettiest lines of druggists' sundries that we have seen in some time is that made by the Ideal Rubber Works, of New York. Their fountain syringes particularly are said to suit the trade to a T.

—The world has been made better by a unique little device just put on the market which ought to have been invented long ago. There is now no need of swearing when opening a stylographic or fountain pen, because the Little Giant (of which we give a cut) will open any pen cap no matter how hard it sticks. The device is patented, and is manufactured by the inventor, E. C. Pfeiffer, 3 Tremont place, Boston, Massachusetts.

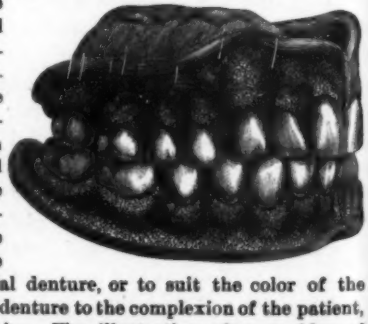


The Little Giant.

—Within the last year there has been a demand for rubber garments that shall grade with the most fashionable wearing apparel.

It has not been a question of price, but rather a call for fine fabrics, delicate rubber coating, and absolute freedom from the rubber smell. Messrs. Barker & Co., of 27 Maiden Lane, New York, appreciating the opportunity, have bent their energies to the production of such goods. They import the finest silks in endless variety of color and patterns, coat them with a film of rubber that is so thin as to be hardly perceptible, and yet is thoroughly waterproof. In fit, style and color, the garments are not to be surpassed, and they are made for ladies, misses or gentlemen. The accompanying illustrations show two of their latest patterns, fashioned by a distinguished *modiste*. No stock of fine garments can be complete without some of these goods.

—The Vulcanizable "Granular Gum" facing, patented by Dr. Gilbert Walker, is a material which is a decided improvement upon the solid color of the pink rubbers hitherto used for facings. The new rubber when vulcanized, polished and wetted (as by the saliva) approximates the appearance of the well-known continuous-gum work, and as several shades can be supplied, the dentist is enabled to either match the natural gum adjoining the artificial gum of the partial denture, or to suit the color of the "Granular Gum" of a full denture to the complexion of the patient, as circumstances may require. The illustration gives an idea of the appearance of dentures faced with the "Granular Gum" on ordinary red rubber. "Granular Gum" vulcanizes with any kind of dental rubber, and a very thin facing is sufficient. Supplied by the S. S. White Dental Manufacturing Co., Philadelphia, Pa.



—A very neat and attractive circular, and one that is unique in its way, is that of the Rob Roy Hose, sold by the Boston Woven Hose Company. The circular unfolded shows on one side of it a

fac-simile of this fine grade of linen hose printed in color that is so near that of the genuine article that one is almost tempted to believe that it is a two-foot section of the hose itself. On the reverse side of the circular are given the specifications for linen hose adopted by the Mutual Insurance Co., all of which the Rob Roy meets in the fullest manner.

"Perth" Coat.

—Messrs. William Currie & Co., the well-known manufacturers of the Caledonian Rubber Works, Edinburgh, Scotland, whose exhibits at the Paris Exhibition obtained one gold and two silver medals, have many novel and exquisite designs in gent's coats and ladies' mantles. From them they select to send us the "Perth" coat and "Russian" mantle, which have been recently introduced, but have already become very popular. The accompanying sketches illustrate the improvements presented by the garments named.

—The "Perth" coat is a sleeveless garment, with a deep cape to cover the arms; the absence of sleeves secures the necessary ventilation, while the deep cape acts as a complete protection against rain. The "Russian" mantle, as the illustration indicates, has a double front; this arrangement also secures ventilation, and gives freedom to the arms. All these forms of garments are made in the latest fashion of material and shape.

—The Imperial Standard Rubber Dam is a new and superior article, that is the result of careful experimentation on the part of Mr. E. J. McCormick, the proprietor of the Imperial Rubber Works, 8 College Place, New York.

"Russian" Mantle.

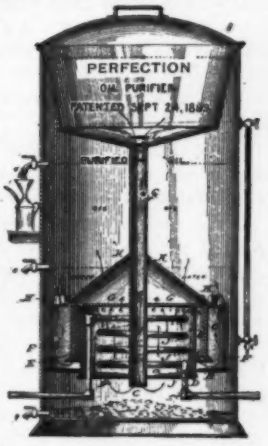
—Economy in fuel is something that is of vital interest to every rubber manufacturer, with the single exception, perhaps, of the Muncie Rubber Co., who are said to have natural gas *ad lib.* The new damper regulator of the Mason Regulator Co., of Boston, is an attachment that every boiler should have, for the reasons that it is moderate in price, simple in construction, and that it infallibly does the work. We propose to submit a fine illustration of this in the February number, and those who are thinking of anything in this line will do well to wait for it, or, better still, send to the manufacturers for a circular.

—One of the latest things in the rubber world is a mill which is not only owned and run by Japanese, but is situated in Japan, and, without doubt, the goods made by these "Yankees of the East" are equal to those made in our country.

—We illustrate herewith the new surgical cushions made by the Davidson Rubber Co., Boston. They are made with an inflatable rim at the top, to prevent the escape of the fluid upon the bedding or clothing, and by the opening and apron this fluid is conducted down into a bucket, placed to receive the same. The rubber has a velvety softness that makes them very comfortable to the patient;

the color is a clear tan, and they are made with the greatest care to give them durability. They are being largely used in obstetrical, perineal, cervical and general surgical operations, especially where cleanliness and convenience is desired, and physicians who have used them speak highly of them.

—Messrs. W. B. Brook & Co., New York, the well-known manufacturers and jobbers of rubber goods, are selling agents for the new "Perfection Oil Purifier," which we illustrate herewith. It has been recently introduced, and sprang at once into favor on account of its simplicity, effectiveness and economy. No chemicals, cloths, charcoal or other filtering substances are required, as it is based upon the relative difference in the specific weight of oil and water. The oil runs through the center tube, below the water, at *C*, passes around the steam coil *JJ*, and now being somewhat diluted, will drop the very finest impurities, and after going once more down through chamber *B*, again up through chamber *C*, then through the discharge pipes *H*, and once more through water, it will finally gather above the line *KK*, ready for use. Whoever has tried the oil filters heretofore introduced, are well aware that oil cannot be successfully filtered, but must be purified, and there is no easier or more perfect way of doing this than by the use of the Perfection Oil Purifier. The very best new machine and cylinder oil is improved by passing through it, while a cheap grade of oil will give better satisfaction than a high-priced oil if used as it comes from the oil merchant. No matter how dirty or gummed up already-used oil may be, it will come out of the Perfection Oil Purifier in a better condition than when it left the oil merchant.



—The Eureka Fire Hose Co., New York, have issued a circular warning the trade against imitations of the celebrated "Eureka Garden Hose," and impressing upon purchasers the importance of seeing that every length bears their trade mark, as indicated in the accompanying illustration. The makers claim that "it is superior to best rubber hose for durability and strength. It is mildew-proof, and will stand over 500 lbs. pressure per square inch, and outlast rubber hose many times over. Expose it to dry after use; though it may be soaked every time it has been used, having no outside covering to imprison the moisture, will, if given a fair chance, immediately dry; no gas is generated and the cotton is uninjured."

Trade Notes.

ONE of the oldest workmen at the Tuttle Rubber Works, in Holyoke, died recently from the prevalent Russian influenza.

—The Knowles & Blake pumps were beautifully advertised at the Maritime Fair, in Boston, by the tiny models of various styles of pumps, among which was a perfect reproduction in miniature of one of the large water works plants in Massachusetts. Few of those interested in machinery passed this particular exhibit without a long and admiring halt.

—It is only the old-established concerns that can produce ancient furniture, quaint machinery, or the old-time engravings of factory buildings that have such a charm about them that causes even the busy manufacturer of to-day to pause and reflect. The Boston Rubber Shoe Company have hanging in their office a picture that at once rivets the attention. It represents Factory No. 1 when it was a beginning. The unique feature of this picture is, perhaps, the attempt of the artist to show the size of the plant that then was in existence. To accomplish this he has made as much as possible of the three-story brick building, with its small wooden office, and indeed has drawn upon his imagination, and added a wing that even at that time did not belong there. In front of the office stands an old-fashioned, two-wheeled chaise. In the field in front of the factory are numbers of laborers and gentlemen clad in the styles that were in vogue more than thirty years ago, and bearing themselves with a stiffness which pictured humanity was apt to do at that time. With all his imagination, the artist could not prophesy of the tremendous expansion that this corporation was to undergo, and, indeed, could he have imagined it, he would not have been allowed to picture it.

—One of the latest "sells" among mischievous boys is a chocolate cream moulded from rubber, which, by the way, is a most unsatisfactory thing to chew.

—The Candee Rubber Company issue two millions of beautiful colored cards with quaint designs on them, showing how serviceable the Candee goods are during the four seasons of the year. These cards are furnished in small lots to retail dealers throughout the country, and serve excellently to advertise the Candee goods.

—A notable thing about Christmas this year was the great number of Macintoshes and fine rubber garments that were given as presents. This is to be accounted for partly by the weather that the whole country has been treated with for the past few weeks, and partly by the beautiful styles and real excellence of the goods that are now upon the market.

—Mr. F. D. Hamilton of the Hodgman Rubber Company, takes a position with the Boston Rubber e Company as their representative in the States of New York and Pennsylvania.

—The popular conception of vulcanized india rubber has been oftentimes mentioned in our columns as being something exceedingly misty. This fact was again brought to our attention recently when a well-known physician called at a rubber factory, and asked for some pure gum nipples, explaining that he had used other makes that contained sulphur, but that he was sure that theirs could not contain anything so injurious.

—The Minneapolis Boot and Shoe Company, of which all papers continue to talk, does not seem to materialize remarkably, nor is there a chance that it will this winter.

—Adjoining the large plant of the Candee Rubber Company in New Haven, is an iron foundry and machine shop. Some years ago the owners of the rubber mill wished to buy it, but the price not being satisfactory, negotiations were interrupted. Within a few weeks, however, the purchase has been completed, and as soon as the iron manufacturers can move away, their buildings will be torn town, and the space occupied by an annex to the Candee plant. The new buildings will be eight stories in height, of brick, and will be 100x140, to which will be added a large wing. The various floors will be used for packing rooms and storehouses; a generous portion of the ground floor being reserved for new and elegant offices.

—A newspaper man in search of information, recently called at a rubber shoe factory to inquire whether the Brazilian revolution would in any way effect their output. After he had been assured that it would not, for the present any way, he remarked, "I did not suppose it could, as I understand you manufacture your own rubber." As it would not have been courteous to undeceive him, he was allowed to depart with his belief.

—On Chapel street, in New Haven, is one of the best-appointed rubber stores that is often seen. Not only are the window fixtures in good taste, and the goods varied and attractive, but just outside on the broad stone flagging that is just off of the sidewalk, are placed two handsome show-cases filled with holiday toys in rubber that really make a gorgeous display.

—The Metropolitan Rubber Company, who purchased the large sewing machine factory at Wallingford, Conn., have, with the additions now upon their buildings, secured a very complete plant. They have at the present time 350 hands at work, and are turning out a great quantity of fine goods. As one rides by their place on the New York and New Haven road, the handsome brick buildings with the conspicuous sign running the full length of them, and the field of solarizing tables covered with rubber cloth, give one an impression of thrift, energy and prosperity that is most pleasing.

—Vulcabeston must be indeed a popular packing, when the Johns Pratt Company, who are the manufacturers of it, find themselves obliged to run twenty-two hours out of the twenty-four, and then are behind on their orders.

—It is not often that a rubber shoe jobber has a chance to make as artistic a display as did Mr. Sage in his recent showing of the Holliday shoe. The beautiful plush and rubber bags in which each pair was packed, massed in his window, were in such contrast to the black of ordinary boots and shoes, that passers-by, almost without exception, stopped and admired. The goods are said to have had a phenomenal sale.

—At this season of the year it is the proper thing for fairs of the various sorts to be in full bloom. A new idea was the Maritime Fair, of Boston, held in the magnificent building of the Mechanics' Charitable Institute. Not only were all sorts of novel marine appurtenances shown there, but manufacturers of various sorts were invited to give exhibits. Of those who took advantage of this was the Waterbury Rubber Company, who made quite a display of their Sphinister Grip Hose, the Elastic Tip Company, whose rubber-tipped arrow attracted crowds of ladies and gentlemen, and the Boston Woven Hose Company, whose space was filled with a variety of mechanical rubber goods, so displayed as to attract a deal of attention.

—We had a very pleasant call on Mr. H. F. Mandell, the treasurer of the Wellman Sole-Cutting Machine Company, of Boston, but a few days since. They have orders already from most of the rubber shoe factories for their improved sole cutter, and the new machine, to use the language of the unregenerate, is a dandy.

—The packing room at the Colchester Rubber Works is some distance below the railroad track, and a very neat arrangement is in use there for running up the cases of shoes to the cars and railroad track in loading. It consists of an endless belt with corrugations upon it at regular intervals, upon which the cases are placed, and shot with some considerable celerity from the floor below to the car above.

—We think it must be a Yale student who is responsible for the statement that a lady walking down State street in New Haven, slipped upon the sidewalk, fell and caused a loud explosion, which was attributed to the bursting of her rubber bustle.

—It is suggested that if the historic and versatile McGinty had been the possessor of a complete rubber suit, his repeated falls would not have been such dire mishaps.

—To the town of Waterbury, Conn., belongs the unique honor of having as a resident a gentleman who sold the first pair of rubber shoes ever manufactured in this country. This gentleman, a shoe dealer by profession, is named Ladd, and in his long years of expe-

rience, is pretty well known to the trade. This item recalls the fact that Lorenzo Blackstone, a former resident of Norwich, Connecticut, and one of the presidents of the now defunct Hayward Rubber Company, attributed the foundations of his fortunes to the sale of a pair of rubber shoes. It seems that he was in London doing business in a small way, and a friend sent him a nicely finished pair of Hayward rubbers. An English friend happening in his office, saw them, and wanted a similar pair. The friends of the purchaser soon began to come in flocks, and almost before he knew it Mr. Blackstone became a rubber shoe dealer. When he saw that the business was becoming remunerative, he applied to the Hancocks, who then owned the sulphur patents for England, for a license which he secured, and began then to regularly import the goods. From this small beginning he built up a profitable business and finally a colossal fortune.

—The Columbia Rubber Company, Boston, are about to put in a new calender, and are increasing their plant for the manufacture of Mackintosh garments very largely this winter.

—Short cuts in the rubber business are the way to "get there," and, as a rule, those who know the most and best of them, are the successful ones among the manufacturers. A case that emphasized this truth but recently, was a happening in the Trenton Rubber Works. The calender gave considerable trouble, as it refused to keep to the requisite degree of coolness without a constant stream of water running through the rolls. As city water is quite an expensive commodity in Trenton, it occurred to the manager that, if a colder stream could be secured, it would do the work quicker, and possibly cheaper. He therefore built an ice box above the machine, and ran ice-water into the rolls. According to report, the scheme works to perfection, cooling the rolls at the briefest notice, and saving so much in the way of water tax, that it is really a measure of economy.

—For the December number of our magazine we had one of the most artistic and effective supplements that has ever been designed. It was a large lithograph prepared for the Boston Rubber Shoe Company, and was to go especially to the boot and shoe men in the United States. In a very few words the text of the document calls attention to the thirty-six years of experience in the manufacture of rubber boots and shoes, under the same management; the gold medals just awarded the Company at the Paris Exposition, and the daily manufacture of 20,000 pairs at each factory, or over 40,000 pairs a day. It also lays stress upon the fact that as there are imitations of their goods on the market, purchasers should be careful to see that the full name of the Boston Rubber Shoe Company is on their goods, as none others are genuine. The supplement was illustrated by beautiful cuts in oval of their two magnificent manufacturing plants at Malden and Melrose. The well-known seal of the Company, and a composite picture of the medals from the Paris Exposition, also adorned the lithograph. This supplement was all ready for insertion, nay, was printed "Supplement to INDIA RUBBER WORLD, December, 1889," when a new ruling of the Post-Office Department stepped in the way. It was to the effect that supplements must be of the same size as the page of the magazine they accompany. If they differ, they don't go. This supplement page was a trifle larger than ours, and no matter how hard we fought, it could not pass muster.

—Mr. J. M. Stotesbury, of the Philadelphia Rubber Works, is in Europe on business for his firm. He expects to return in February.

—Mr. R. R. Whitehead, of the firm of Murray, Whitehead and Murray; Mr. J. Oliver Stokes, Manager of the Home Rubber Co.; Mr. Thomas Bell, Secretary of the Star Rubber Co.; Mr. Jos. Whitehead, of the Hamilton Rubber Co., and Mr. R. H. Hayes, of the Trenton Rubber Co., will be in England by the time this item is in type. Their journey is, to a certain extent, the outcome of the negotiations that have been in progress for some time past for the purchase of the Trenton Rubber Mills by a syndicate of English capitalists.

—The publishers of THE INDIA RUBBER WORLD take this means of thanking the Revere Rubber Co. for the elaborate bas-relief of their factories at Revere, Massachusetts, and the framed plan of the works will be added adornment to the sanctum.

—A happy Benedict, and one whom we take pleasure in congratulating, is Mr. F. F. Schaeffer, Superintendent of the Goodyear India Rubber Glove Co., at Naugatuck, Conn.

—We learn that the whole of the rubber machinery at the plant of the Union India Rubber Works, at Harlem, is for sale.

—The American Rubber Company have issued a circular-letter from their new branch store at 78 Reade and 177 Church streets, New York, in which they say: "We have located as per above address, where we will carry in stock a full line of our goods, thus being prepared at all times to fill orders promptly as to style, sizes and widths. Soliciting a share of your business, we are, etc."

—Mr. Street, the genial Superintendent of the Gutta Percha and Rubber Manufacturing Company of Toronto, tells with great gusto of the earlier days of the rubber trade, when he was superintending a factory in the States, of an old Irishman whom he employed to run the mixing mill. When first this son of Erin mixed, the batches of rubber were exceedingly large, and the boxes of compound were very small, but as time rolled on, and competition became closer, the modicum of rubber gradually lessened, while the compound boxes were heaped higher and higher. At length the time came when the boxes had to be enlarged, an inch being added to their height, and then they were filled full. Up to this time the old man had held his peace, but when this was done, he turned to Mr. Street with a twinkle in his eye and said: "By-and-by, Mr. Strate, ye will be bringing the compound to me in a tip-cart and the rubber in a thimble."

—Mr. R. W. Morrell, the manager of the New York agency of the Standard Rubber Co., is quite ill at the United States Hotel, Boston. His trouble is a bronchial difficulty brought on by the grippe weather.

—A correspondent sends to a trade paper to know how to bore holes in rubber stopples. The paper goes to some trouble to describe a sharpened brass tube that, wetted with soap and water, will accomplish it. A far easier way is to have the stopples made with holes in them, which any rubber manufacturer can do by putting an iron pin through the center of the unvulcanized rubber, curing it there, and removing the pin which makes a hole.

—Rubber men should have an especial interest in Nellie Bly, who is speeding round the world against time. They should also feel like guessing on the time she will make, for is she not the sister of one of the brightest rubber men of the West? Her real name by the way is Cochrane.

—The Empire Rubber Co. is the only one of the Trenton rubber companies that is not in the prospective deal that will make them all English.

—More than a year ago the town of Colchester, Conn., voted to tax the Colchester Rubber Co. for $50,000, only for a period of ten years. This winter, however, the assessors have brought in a tax bill on $75,000 and add ten per cent. to this because the company have not submitted a list of its property. To say that the company, as represented by Mr. Watkinson, are surprised and indignant at this course of procedure is to state it but mildly. As we go to press the town of Colchester is holding a meeting to discuss the matter of the rubber mill taxes. It is no secret that if the first agreement is not kept, the mill will not be started up again. Orders have also been given for the discharge of all hands except such watchmen and clerks as are needed to keep the works in order when they are not running. It must not be thought from this that the company contemplate retiring from business. On the contrary they have offers from several towns and cities to locate their business there. One that is said to be viewed with special favor is the offer of the city of Waterbury, Conn., in which a fine plant is to be furnished, special exemption from taxes guaranteed, and the machinery from the Colchester mill moved without cost to the company. Possibly when the sleepy, self-conceited policy of this country town has succeeded in driving out its chief industry, there will be a sudden real-

ization of the loss they have sustained. It is not long since the whole town was in mourning because the rubber mill was shut down for a couple of years. Unless promises are kept better than they have been, crape will be again worn in Colchester.

—Latta & Mulconroy, whose store on Arch street, Philadelphia, is so well-known to buyers of rubber goods, have removed from No. 503 to 706 Arch. Their present quarters are very commodious and especially adapted for showing the large line of goods that they carry. As agents for the Revere Rubber Co. and the Fabric Fire Hose Co., they are able to exhibit some of the finest rubber goods that are manufactured.

—At the beginning of the year a neat calendar is always in order, indeed almost every one is on the lookout for something of the kind. One that will interest every rubber man is that issued by the Boston Belting Co. Grouped about the white slips that mark the flight of the months, are elegantly executed cuts of piles of packing, coils of hose and rolls of belting. At the top is a fine picture of the factories situated in Boston's historic Roxbury district.

—Mr. Wm. J. Kelly, who is well-known to every rubber manufacturer as a broker in india rubber, has removed his Boston office to No. 184 Franklin street.

—A very pleasant gathering was the annual dinner of the Gossamer Manufacturers' Association held at Young's Hotel, Boston, on the evening of December 19th. The spread was all that could be desired, and most of the manufacturers of gossamer clothing were present. From the general trend of the table gossip it was evident that the past year has been a successful one, and that all were satisfied with the outlook for the future.

—A well-known traveling man in mechanical rubber goods, when he essayed to sell rubber belting, was asked by his would-be customer whether the belting would stretch. With the feeling in his mind that elasticity was the most necessary thing in rubber, he replied cheerfully "that it would stretch one-third of its length and come back every time." It is needless to say the sale was not consummated.

—The Home Rubber Company, of Trenton, New Jersey, for the last three months have been obliged to run night and day to fill their orders, and this in spite of the new grinders and presses recently added to their plant.

—It may by this time be a trifle late, but we cannot help admiring that exceedingly neat advertisement of the B. F. Goodrich Rubber Company, of Akron, Ohio, called Freddie's Slate, and we believe that others even now view it with pleasure, for we see it hanging in many offices.

—The Chicago Rubber Clothing Company have added three new buildings to their excellent plant at Racine, Wis. Not that we have been there recently, but a traveling man just from the West speaks in high praise of their facilities for turning out solarized and vulcanized garments.

—Mr. Elliott, Superintendent of the Candee Rubber Company, is one of the possessors of the rare Goodyear Book, which he naturally values very highly.

—Messrs. Spinney, Virtue & Co., of Lynn, are running their factory to its full capacity, which is three thousand pairs of soles daily, and eighty thousand pairs of their new deodorized shoe counters per week. By the way, they guarantee these counters in every case to outwear the shoe and never to break down.

—The representative of the Lake Shore Rubber Works, Mr. Perse Deverell, called at the office of THE WORLD recently on his way to see his Southern trade. Mr. Deverell seems to hit the trade where they live, for he reports the output of the Lake Shore Works to be constantly increasing; and indeed, the plant to be three times as large as it was a little over a year ago. The U. S. hose manufactured by this company is an especial success, and is making an enviable reputation for its makers.

—The Rubber Tipped Arrow Co., of Boston, have brought out a novelty in the shape of a toy pistol that has sprung into instant favor. It is simply a small air gun that shoots an arrow four inches long which is actually "shod with velvet." In other words the front end of the arrow has a tiny rubber cup upon it which clings to the face of anything smooth, and yet even if fired point blank alights so softly that it is absolutely harmless.

—The New Jersey Car Spring and Rubber Company, of Jersey City, have just added machinery to their plant, which will enable them to increase their output to a marked degree. The improvements consist of the remodelling of their engine, the addition of seven new mixing mills, of the Ansonia pattern, and the rearrangement of the whole grinding room. With these added facilities, the daily output of the factory will be increased fully five tons.

—The Imperial Rubber Works is the name that somehow has a familiar ring, even if it does date its existence from the first of the year. The familiar sound comes, no doubt, from the well-known brand, *Imperial Standard Dental Rubbers*, which have been manufactured by Mr. Edward J. McCormick for some years past, and have attained great popularity. Mr. McCormick, in severing his connection with the Excelsior Rubber Works, takes with him the secret process by which these rubbers are made, and begins their manufacture for himself, under the name of the Imperial Rubber Works. A new product of this Company is the Imperial Standard Rubber Dam, which finds many friends among the dental supply men, as its lasting qualities are something phenomenal. The factory of this new Company, owned by an old friend, is at 8 College place, New York.

—The Mattson Rubber Co., of New York, have increased their plant by the addition of a large locomotive boiler, and by the entire re-arrangement of the grinding room. Even with the assistance of this new machinery, however, they are obliged to work night and day to fill orders.

—Col. Richard Vose has retired from the Eureka Fire Hose Co., New York, having sold his interest to his former associates, and at the annual meeting of the stockholders on the first of the year, the following officers were elected, viz.: President, J. Van D. Reed, formerly treasurer; Vice-President and Treasurer, Junius Schenck, formerly secretary; and Secretary, G. A. Weis, formerly cashier.

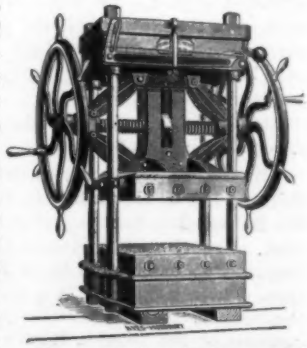
—Mr. W. A. DeLong, of DeLong, Betts & Co., New York, is back at his desk after a fortnight's outing in Calhoun Co., Ala., where he has some extensive land and mining interests.

—The Hazelton Boiler Co., New York—see announcement on folio IV—have made an enviable record with their boiler in rubber works. They have been in use for some time in five of the leading factories in the country, and by reason of their special adaptability to the requirements of rubber work, they are fast making friends in the trade.

The Boomer & Boschert Press.

THE accompanying cut represents the knuckle-joint vulcanizing press made by the Boomer & Boschert Press Co., of Syracuse, New York.

It is particularly well adapted for mould work, as the pressure, although very great, is easily applied, requiring no hammering of hand wheels to do even the heaviest work. For light work or for soft metal moulds, the indicator showing the pressure applied, is invaluable. This press is made in various sizes with plates ranging from 12x14 inches to 66x72 inches, and with two, three or more steam plates. The larger sizes are run by power, thus effecting great economy of time and labor.



The steam plates are cored in a way to secure the best distribution of steam, and to heat very evenly. The reputation of the makers is a guarantee that material and workmanship are first-class, and the large orders recently received attest their popularity.

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ANNALS

—OF—

India Rubber, Gutta Percha, Celluloid and Asbestos.

India Rubber Caoutchouc or Gum Elastic [called *cachuchu, cahuchu,* by the South American Indians; German, *kautschuk, federharz;* French, *caoutchouc, gomme élastique*] the concrete milky juice of numerous trees and plants growing throughout the tropical regions.

Gutta Percha [called in all languages by that name which is of Malayan origin; *gutta* signifying gum, and *percha* the tree from which it is obtained] the concrete milky juice of trees belonging to the family of Sapotaceæ, found in the Malayan forests and islands of the Eastern Archipelago.

Celluloid, a product of recent invention, obtained by dissolving *pyroxylin* or *gun cotton* in camphor or other solvents with the aid of heat and hydraulic pressure.

Asbestos, Amianthus [Greek, *asbestos,* inextinguishable, and *amiantos,* undefiled; Latin, *amianthus asbestinum;* French, *amianthe;* German, *asbert*] a fibrous mineral found mainly in veins in the serpentine and other primary formations throughout the entire world.

(*Continued from page 57.*)

1833.—Ruggles (Nathaniel) and Breed (Samuel D.) obtain separate United States patents for attaching soles to boots and shoes by means of caoutchouc.

1833.—Barnard, of Greenwich, discovers *caoutchisine* (caoutchoucine), "a solvent not hitherto used in the arts," while trying to coat cables and ropes with caoutchouc. He found that when the last-named substance is exposed to a temperature of 600° F., it resolved itself into a vapor which, when condensed, possesses the property of dissolving india rubber in large quantities.

1833.—Hood (J. M.) exhibits, at the Fair of the American Institute, a number of india rubber boots, made in New York, but which had been sent to South America to be varnished with the fresh juice of the caoutchouc tree.

1834.—Mabe (W.) obtains an English patent for lining safes with asbestos.

1834.—Jones (Dr. Alexander), of Mobile, Ala., exhibits a description of carpeting, made by applying india rubber varnish to canvas previously covered with wall paper.

1834.—Mackie (Dr. Patrick), of New York, obtains a patent for the covering of ropes, which are likely to be exposed to the weather, with india rubber dissolved in the purified naphtha of coal-tar, or in such substance as possesses the property of dissolving caoutchouc.

1834.—Cooper (George Duncan), of New York, is granted a patent for "the application of gum-elastic sheets . . . to vessels and roofs of buildings to prevent their leaking. . . ."

1835.—Sievier (Robert William) obtains, December 7, an English patent for elastic waterproof cloths or fabrics having surfaces either of fibrous matter, of various colors or of corrugated design, similar to morocco, etc.

1835.—Atkinson (William) obtains U. S. patent, October 6, for process of cutting caoutchouc into shreds.

1835.—Hancock (Thomas) is granted his seventh English patent "for an improvement in rendering caoutchouc air-beds, cushions, pillows, etc., more elastic and capable of yielding more uniformly to the pressure of the body."

1835.—Organization of the Eagle Rubber Company at Woburn, Mass., which failed during the financial panic of 1836-37, and whose factory was taken by Nathaniel Hayward, that he might complete there his experiments as to the treatment of india rubber with sulphur.

1835.—Goodyear (Charles), who had during the previous five years been experimenting with india rubber, finds a new method of dissolving it in turpentine spirits, as shown in the following extract from letter of Prof. L. D. Gale, of the New York College of Pharmacy, under date September 1, 1835: ". . . . The gum, reduced to the consistence of stiff paste by means of common spirits of turpentine, which requires no purification, is again restored to its original elasticity and imperviousness. The viscous or adhesive property which belongs to the gum in its natural state, and which is increased by the solvents generally used, has heretofore presented all the obstacles to the success of the manufacture and uses of this article. The process of Mr. Goodyear, by which this difficulty is removed, depends on chemical principles, which are fixed and invariable, and there seems to be no possible obstacle to its practical application."

Of this new method, which it was not then deemed davisable to make public, Prof. B. Silliman, of Yale College, thus wrote a few months later: ". . . . a process by which he dissolves caoutchouc with common spirits of turpentine; and then by another process he restores it again, so as to form a thin sheet, or fabric, without tissue. This fabric is divested of the clammy qualities that exist in the native elastic gum. . . . . Mr. Goodyear has prepared his elastic gum in my presence, by spirits of turpentine, and then brought it back without mixing or blending any other substance with it, so that it becomes again strong india rubber, but free from any clamminess; and feeling, when pressed between the hands, like linen or cotton."

This result was achieved by "boiling the articles compounded with magnesia, in quick lime and water, which appeared to have the effect of tanning the gum, and destroying its viscous property."

1835.—Goodyear (Charles) exhibits articles made by his novel process, and receives medals from the N. Y. American Institute, "for a new discovery in india rubber," and from the N. Y. Mechanics' Institute, "for a new method of manufacturing india rubber." During the ensuing year he is given other medals by the same institutions, "for india rubber drapery not liable to decomposition from exposure to the sun," and "for the application of india rubber to printing."

1836.—Martin (James) patents in England, February 27, "an olefiant or etherial essence for the purpose of dissolving caoutchouc, to render it applicable to various useful purposes."

1836.—Westhead (Joshua Procter) is granted an English patent for "a machine . . . . by which the caoutchouc advances against the edge of a revolving knife . . . . which cuts it into the required ribbon."

1836.—Sievier (Robert William), the same who obtained

a patent in 1835, and who was formerly a director of the Joint Stock Caoutchouc Company, patents, in England, the method of dissolving caoutchouc in liquor ammonia.

1836.—Pickersgill (John) is given an English patent for the application of india rubber to the surfaces of fabrics "without the aid of solvents and without the necessity of bringing the caoutchouc into a state of fluidity."

1836.—Nichols (Christopher) patents the method of converting into threads all descriptions and shapes, or remnants, of caoutchouc. He heats the latter, passes them through rollers and grinds them "till the mass becomes equal," and then presses the mass into moulds, after which the compressed rubber can be easily cut into sheets, ribbons and threads. Some of the last-named varied in fineness from seven hundred to five thousand yards to the pound.

1836.—Hancock (William) applies a solution of india rubber to the binding of books.

1836.—Chaffee (Edwin M.) obtains United States Letters Patent, August 31st, for a new and useful improvement: (1st) in the application of undissolved caoutchouc to cloths, leather and other articles; (2d) in colouring the same without the aid of a solvent, and (3d) in the machinery used in the process. These Letters were duly extended by the Commissioner of Patents, under the Acts of Congress, for a further term of seven years from the 31st day of August, 1850.

As this innovation has by many been called the *foundation* of the American rubber trade, it will be well to enter here into some details as to what, at this juncture, certainly proved to be a decided *turning point:*

Chaffee's invention was mainly for a preparing machine (grinder-mill), and for a coating and covering machine (or Calender).

The preparing machine consisted of a hollow cylinder or roller, six feet long and twenty-seven inches in diameter, surmounted by another cylinder of same length, but of only eighteen inches diameter, both heated by steam, or otherwise, to about 200° F. The rollers came in contact on one side at about ten inches distance from the top of the larger one, and, as one rolled faster than the other, there was a compound rolling and slipping action between the cylinders. Five bars were placed on top of the larger roller, and the lower edges were so constructed as to leave a wedge-like space for the rubber, with or without coloring matter, to enter between the bars. A revolving band was attached to the machine so as to carry the rubber between the two cylinders. The rubber was first cut into pieces, about two inches square and from one-eighth to one-fourth of an inch thick, then spread upon the band which conveyed it to the heated cylinders. There, "the compound rolling and slipping action" softened and tore it into threads or sheets, which latter at the same time partook of the coloring matter placed between the bars, until it was deemed ready for coating.

The coating or covering machine consisted of four hollow rolls or cylinders placed one above the other, each six feet long and capable of being heated, by steam or otherwise, to about two hundred degrees, Fahrenheit. The lowest and top cylinders were eighteen inches diameter, and the two inside ones only twelve inches diameter. The third cylinder (next to the top one) moved much slower than the others, thus creating a compound rolling and slipping action between the surfaces of the second and third, and of the third and fourth rolls. The cloth or other article to be coated was made to pass into the machine between the second and third cylinders, thence half way around the second and first, while the prepared rubber entered through a hopper placed opposite the third roll, when the coating was effected.

This coating machine was called the "Monster," or the "Mammoth," on account of its dimensions. It weighed about thirty tons, and was finished toward the end of the year 1836, at a cost of $30,000.

The way the rubber was first applied by Chaffee, at Roxbury, was by dissolving it with from three to four quarts of spirits of turpentine to one pound of rubber, with the addition of enough lampblack to give it a good dark color. It was then "flowed" upon cloth extended on wires, in a building long enough to have whole pieces, lying one above the other, stretched out their whole length. The rubber was "flowed" on from a box so arranged that a regular supply passed from the box to the cloth, as it unwound from a roll on to the level wires above named for the same, where it remained for a day or two to evaporate the spirits, which time varied with the weather. This was called the flowing process, and was very expensive. By Chaffee's new method, all solvents were dispensed with. This saved "The Roxbury India Rubber Factory" about 30 to 36 barrels of turpentine per week, and altogether from thirty to forty thousand dollars per annum, and there was likewise a saving equal to one-half the amount of labor employed in the old process. By the latter, it was necessary to run on from four to eight and ten coats of dissolved rubber, according to the thickness of the coat or sheet, and, after each coating, the cloth had to be exposed a long time to the air to evaporate the solvent, but the new process required only three or four coats in all, which could be applied successively, and which admitted of the cloth being immediately rolled up.

The "Roxbury India Rubber Factory" purchased of Mr. Chaffee his entire interest in the "Monster," and, during the month of October, 1843, the huge machine was sold at public auction for only $525 to John Haskins, who, at the same time, purchased the patent for one dollar and fifty cents! During the year following, 1844, Haskins disposed of the "Monster" to Charles Goodyear, who, shortly afterwards, transferred it to the Naugatuck India Rubber Co.

1836.—Goodyear (Charles) makes, in New York City, his first important discovery. He had already made up a compound by boiling caoutchouc and magnesia in quicklime and water, but it was found not to answer his purpose, as it softened and even fermented. Goodyear now introduced a method of treating the surface of native india rubber by dipping it into a preparation of nitric acid, thus enabling the manufacturer to expose an india rubber surface to his goods, which, on account of adhesiveness, was theretofore impracticable. For this method, Goodyear took out a United States Patent, June 17, 1837, and, although the acid benefited only the actual surface of the rubber, goods continued so to be made until the introduction of vulcanization. The announcement of Goodyear's discovery attracted much attention, and samples of manufactured goods were taken by him to Wash-

ington, and shown more particularly to President Jackson, to Henry Clay and to John C. Calhoun.

The President's acknowledgment reads as follows:

"WASHINGTON, 4th March, 1837.

"MR. CHARLES GOODYEAR:

"DEAR SIR—I have received, through General Upton, of the Senate, your note conveying a print on gum elastic, and specimens of the pure gum designed for bandages for wounds and other useful purposes. I thank you for these samples of your skill in the new art in which you are engaged, and which I have no doubt will be found useful in a great variety of ways. I can only wish you success in the prosecution of your useful labors, and assure you that the sentiments of kindness which you express are cordially received and reciprocated by your humble servant, ANDREW JACKSON."

(To be continued.)

Knife Coating of Fabrics.

SPREADING rubber, either by means of the calender, the knife or the "English machine," has been reduced to a fine art, more progress having been made in the past five years than ever before in the history of rubber manufacture. When the gossamer business took its first start, and while even the longest-headed of the rubber men were debating as to whether the goods would ever become "staple" or not, we wrote a description of a "spreader" that we then worked on. As the machine is still in use, we let the matter stand as written, with a few additions. Since that day we have seen most of the means of knife spreading used in the United States, and, with the exception of the appliances for making checks and stripes, and for "electric finish," the knife has remained about the same.

To go back to the beginning of coat-making is to reach a period that antedates the appearance of either Goodyear or Hancock, for long before their day the waterproofing qualities of caoutchouc were well known. The gum, mixed with a variety of foreign substances, to overcome its stickiness, was brushed upon fabrics which were made up into rubber clothing. This clothing was, however, far from being as elaborate as the lengthy circulars of the time represented. Wherever it folded upon itself it stuck. Piles of coats in the warehouses became welded together in a most provoking unity, and under the influence of heat the coating grew to a pitchy stickiness, that was as unpleasant as it was inconvenient. In the light of all this knowledge it is not strange that the odd, tropical, ill-smelling gum was not appreciated. It was a diamond in the rough—needing cutting and setting before its beauties could be discernible. In the meantime, all who could afford the luxury wore the clothing and bore its discomforts with old-time philosophy.

A change came, however, and a new rubber coat took the place of the sticky one. The discomforts of the old had no place in its shiny folds. No dampness could penetrate it; heat or cold did not affect it, and no amount of folding or pressure could induce it to stick. Then it found friends enough. The few factories were crowded with orders. The clothing was everywhere in demand, and its success was forever assured. The old, laborious way of brushing the dissolved caoutchouc upon the fabric with huge flat brushes became too slow. A revolving brush with stiff bristles, made in cylindrical form, became so clogged with the rubber when the solvent evaporated that it became entirely useless. Stretching the fabric over a drum and drawing huge-bladed knives over it was a little better, but the *best* of the "spreading" was yet to be discovered. The first awkward measures had served to make the pathway plainer, and soon the simple and easy way came to light.

The fabric was wound in rolls. Within each roll was a hollow core, through which ran an iron bar. This bar was set in such a manner as to revolve between two uprights, upon one of which was attached a small brake to regulate the tension of the fabric. On a line with the roll, and quite near it, was placed a "drying table" made of steam pipes, over which ran smooth iron rollers. In the uprights just above the roll were two small iron rollers set side by side, and above them hung the "knife." When not in use it hung high up, leaving the space above the two rollers free, but as soon as the cloth was stretched tight across the rollers down came the knife, its dull blade sweeping close to the first roller, but passing over it, and then hanging against the second. The "spreader," taking a huge knifeful of cement from the tub which had been prepared for him, placed it upon the cloth the whole length of the knife-blade. The cloth was then pulled slowly through. It must pass between the blade and the roller, and the heavy knife scrapes off all of the surplus, rolling it along over the cloth in a dark cylinder of stickiness, while the coated part, smooth and even, was drawn slowly over the "drying table." The heat from the steam pipes rapidly evaporated the solvent, and by the time any part of the fabric had reached the further end of the table it was fully dry, and was wound upon a second core.

The operation was simple and easily carried out. The thickness of the cement made a difference in the thickness of the coating, as well as in its smoothness. The work, owing to the rapid evaporation of the solvent, was not very agreeable, nor was it seriously unhealthy. The fear of fire, that bugbear to all rubber workers, has ever been felt in full force in the "cementing room." It was no unusual thing to see a whole piece of cemented cloth suddenly burst into flame from the heat of the drying-table. Sometimes a number of tables took fire at once, making very lively times for the "spreaders." There was, however, little danger as a usual thing, for the fire burned out in an instant, consuming the thin coating of caoutchouc and then dying. Great care was then taken that the contents of the iron tubs were not ignited, as that might be a serious danger. The best knife-spread goods are vulcanized in a "dry heater." Solarized goods are not vulcanized in the proper sense of the word, but are dried in a sun-bath. When this is intelligently done excellent results are obtained, if the solarizing tables are well placed and the atmosphere is not too humid.

At the present time, in ordinary gossamer work the steam table is not used. The cloth, instead of being wound on rolls at each end of the machine, is pasted together end for end, forming a long endless belt. This revolves under the knife and is coated with a very thin cement, so thin that it takes from eight to thirty coats to get it to the requisite thickness, even for the thin gossamer garment. The "starch" is put on before the knife just as the rubber coating is, and the striping is done by a variety of devices, all of which, however, are but modifications of the spreading blade.

The India Rubber Tree.

R. K. MUNKITTRICK IN "PUCK."

The india rubber tree
Blows in a climate warm,
Where buzzes the golden bee,
And the butterflies brightly swarm.

The wood-dove in it coos,
And the song-bird in it toots
Of rubber ulsters and overshoes,
And foot-balls and rubber boots.

Alas, alack, ah me!
I mark and I ween and trow
That, to be consistent, the rubber-tree
Should bloom in a land of snow.

Every-day Work in the Factory.

BY NICK R. AUGER.

A FEW years ago a great many rubber superintendents held very closely to their compound books; indeed, they were kept under lock and key, were glanced at when none of the help were by, and prized as if made of the purest gold. To-day, probably one-half of the rubber men keep these books only as matters of reference or of comparison. They are used still, but were they destroyed the contents could be easily replaced from memory or general information, not only of the varieties of rubber used, but also from an intimate knowledge of the adulterants that go to make up the compounds. At the same time the rubber superintendent is always ready to test anything new.

A Formula That Would not Work.

Not long since a practical journal published a formula for a sponge compound that was said to be something phenomenal. Without knowing how many rubber superintendents tried this, we are in a position to know of the experience of at least one. Just what the formula was does not matter, but a prominent factor in it was carbonate of ammonia. With considerable enthusiasm this gentleman began work, mixed a goodly batch, and taking it to the press room filled a mould. He then put in into the press, and as it was quick heat, waited for it to vulcanize. While waiting, there came a sudden report, like the firing of a small cannon, and at that instant the side of the press tilted up and two strips of rubber shot out on the floor. It took several minutes for the astonished experimentor to realize what had happened, and to lay the blame to the volatile ammonia.

As a further experiment in the same line, he put a very small piece of the stock in a heavy clamp mould, and being careful to give it room according to its strength, placed it in the vulcanizer. This he gave a slow heat, and, after allowing more than the usual time to cool, he opened the heater. This time also, to his surprise, he found that the strength of the ammonia had been underated, as the rubber had forced itself out of the mould, even pressing the metal to one side, giving it a lipped appearance, while the rubber itself had entirely disappeared. It is needless to say that he did not add further experiment to that one, nor could he think of any method by which he could make a good carbonate of ammonia tractable enough for sponge stock.

A Fancy Vulcanizer at High Cost.

Of course, all lines of business have their own peculiar troubles, but it does seem sometimes as if the rubber business had a bit more than its honest share. The thought that provoked that remark does not come from the explosion of the ammonia compounds, but rather from the story told by the superintendent of one of the large shoe factories. It relates less to vulcanizing than to vulcanizers. In the earlier days of his successes, he had a very nicely fitted room for curing dry heat goods. As a further finish for this room he calcined the whole inside of it with the very best of calcined plaster. When it was all dried he ran in car after car of his best goods. After the usual seven-hour heat these were brought out, and to his amazement, he found them coated with something that looked like mercury, and indeed, had he attempted to galvanize every boot, he could not have done so with any better effect. As this would not be popular with his customers, of course he was anxious to find the cause of the trouble, and to remove it. A second heat of goods being cured, the result was exactly the same.

In those days this superintendent was especially gifted in vigorous English, and the expressions that he then gave vent to respecting this phenomena, showed how deeply he was puzzled, but they did not solve the problem.

Finding that even the strongest talk did not help him out, he sat down for solid work, called in his foreman, and the aggregate wisdom of the mill was brought to bear upon this most provoking mystery. To make a long story short, after a deal of experimenting they discovered that the fault lay in the beautiful calcined finish of the room. To all appearance it was hard as rock, but in reality it had absorbed a large amount of moisture, which, driven out by the heat, had silvered the goods. It was then that he added to his store of knowledge another item which was: never to calcine the inside of a vulcanizer.

Frame it and Hang it up.

To turn from heats and heaters of all kinds, let me sandwich here a very neat little recipe that was given me by a traveling man a few days since. It should be framed and hung up in every compounding room for service in testing rosins for the presence of acid. It is not necessary to elaborate upon the harm that acid does in rubber goods. Every rubber man knows all about that, to his sorrow, and hence we believe that this simple formula will be treasured by many of the users of resinous gums. It is simply the dissolving of the gum in sulphuric ether, and the immersion in the liquid of a piece of blue litimus paper. If acid is there, as it is always in commercial rosin, since the gum consists of acid anhydrides, it will make its presence known by the instant coloring of the paper to a beautiful red. Were I disposed to give free advertising, I might say just here that there is a company who manufacture a rosin perfectly free from acid, and in special shape for rubber compounding.

A New Use for Electric Tape.

I ran across a fakir on the Bowery but a day or two since, who had in his possession quite a number of rolls of electric

tape which he had cut into small strips, and was peddling out as a remedy for cuts and bruises. I had often seen the help in the mills bind up hurts with this same soft friction, and now that I ponder, I knew that the cuts healed rapidly. As far as attaching a commercial value to the medicinal qualities of electric tape, however, I had never thought of such a thing. Nevertheless, isn't there something in this?

CHANGES WROUGHT BY THE TUBING MACHINE.

One of my friends the other day was setting up a tubing machine, and I was led to moralize a little by noting the changes in hand-made and machine-made tubing since the days when I ran a tubing machine myself. Then it seemed that tubing a half an inch in diameter was quite remarkable, and when run well was worthy of special praise, being something that everybody could not do. But since then what changes have happened in the world of squirting machines. Numbers of companies make not only tubing of all sizes, shapes and varieties, but they make solid forms for their mould work, cushions for billiard tables, solid cord of almost any thickness. In several factories, also great tubes with the diameter of several inches are squirted by the tubing machine, cured and cut by automatic machines into thousands of jar rings.

The Yankee and the English Rubber Manufacturers.

To the Editor of THE INDIA RUBBER WORLD:

In the December issue of your valuable magazine, I noticed a part of a story in an article called "Wrinkles," which I desire to tell here in full, as I had it from the lips of the gentleman to whom it happened. It was with regard to the Yankee trick that you mentioned: Where the English judge was made to believe that the goods of the American were entirely different from those of the Englishman. When a certain young man, whom we will call Mr. R., was in England, he was, as you stated, a manufacturer of india rubber goods, and had hardly got well started in his line when a large company stopped him and summoned him to court for infringing on their patents.

They brought into the court several varieties of goods cured with sulphur, while he brought but one sample of his goods cured with something else. Prior to this he had secured the chemist of Queen's College and taken him down to his factory and shown him how he compounded his goods, so as to have his testimony to fall back on in case of need. The American made a strong pull on the blackness of his goods, to which his rivals replied that that was merely a mechanical trick, and that they next day could produce goods just as black as his. The hearing was adjourned, and the next day they brought in rubber valves as black as possible, and to all appearance exactly like his. It was then that the young man noted that their samples were not quite cured, and it flashed into his mind what he could do in that case; he therefore secured the court official, and going out with him, purchased two bottles of camphene and a knife, and returned to the court room. He, then, with great ostentation, cut two-inch cubes from his own sample and from those of his opponents and put them into the bottles of camphene and had them sealed with the judge's seal, upon which was a beautiful crest, and left them until the next day. On the morning of that day he appeared in court confident that his case was won, and sure enough it was, for his fully cured goods remained the same as they were when sealed, while those of his rivals had swelled until the cube had turned into the likeness of a bologna sausage, which was enough to decide the case in his favor. M. L. R.

NEW YORK, January, 1890.

How to Test Rubber Shoes.

A QUESTION that is asked by buyers of rubber goods, more especially rubber boots and shoes, is: "What means have I of testing rubber foot-wear so that I can tell, beyond a peradventure, whether it be first-class or second-class?" In answer to this we would say, the best test for anything of the kind is practical use. To know really how long a pair of rubber boots or shoes will wear they must be worn, and even then on the feet of heavy men, with hard usage, they will stand but a fraction as long as they will under more favorable circumstances.

There are, however, certain tests given by those who claim to be experts in rubber matters that are perhaps worth knowing, even if they are a trifle cumbersome and rarely tried. For example, the specific gravity test of the rubber in the uppers will determine to an extent how pure a compound has been used. This, however, may not always be accurate or at least it would not always be so if the rubber shoe companies were in the habit of using a "substitute" in their uppers. The American companies at the present time are not using a particle of rubber substitute in their uppers. There are certain of them that have used a little in the soling in combination with the devulcanized rubber, and claim that they get a softer result than they would without its presence. At present, therefore, specific gravity tests will determine very nearly how pure the rubber compound is. Aside from this, in examining uppers, the expert must be careful to note the thickness, to observe if it has the requisite elasticity for its thickness, to see if when doubled heel to toe it springs back with right life, and that this does not depend entirely upon the steel shank. To see further that the vamp when pressed down flat, springs up in a lively fashion. All these things must be noted and no arbitrary rule can be laid down for them. Of course, a gossamer shoe cannot be expected to be as aggressive in its "come back" as is a heavy lumberman's shoe, at the same time the stock may be a great deal better. Of those who handle a great many rubber goods, "feeling" tells a deal about their wearing qualities. I imagine it is much as it is with the "candling" of eggs. It is said that those men who handle in a day's time hundreds of dozens of eggs, holding them up to the light and seeing if they are perfect, become so skilled in this work that the mere contact of the fingers with the shell of the egg is sufficient to determine whether it be good or bad, and that after the egg handler has really learned his business, he rarely uses the candle test, but comes to depend wholly on the sense of touch. In this same way the skillful rubber dealer comes to know his goods by their feeling and gives them a guarantee from that rather than from any other test.

To those who are not thoroughly posted in this line, perhaps the best thing that can be done is to select the brand of one of the best known companies whose name is a guarantee of goodness, and trust to their judgment as to style and durability. In pursuing this course the retailer will rarely be led astray, and with his growing knowledge of the trade will come this second sight, or perhaps a better term, this second feeling which will enable him to determine instantly whether the goods are such as he can recommend.

The Rubber Nipple.

THE first step in the preparation of a first-class hand-made nipple is the mixing of the material. It is commonly mixed sheet, either white, black or maroon. "Lead gums" are but seldom used for black, because of their alleged poisonous qualities. The fine tracery of parallel lines that cover the surface of certain kinds of nipples, imparting a flesh-like grain, is called the "print," and is given to the mixed sheet before it is cut into nipple pieces by a corrugated roll.

A simple and inexpensive manner of producing this print is to have a metal plate, upon the surface of which parallel grooves are marked. These grooves are clear-cut and even, with no breaks, and of the same depth. From this rubber impression plates may be made by placing a sheet of vulcanized rubber upon the metal plate, rubber side down, and curing in a steam press. The result will be a plate as good as the original, and capable of more wear and tear. Indeed, this new plate is for practical use far superior to the metal, for when the latter would unavoidably receive dents and abrasions which would soon obliterate the print, and in addition to this would be so heavy as to be cumbersome in the extreme, the former may be hammered and knocked in all possible ways, and yet show no abrasion, and, better still, is so light that it can be handled with the greatest ease.

After a sufficient number of impression plates have been prepared, the mixed sheet for the nipples is cut into lengths that shall fit between the plates, each plate is wiped lightly with a brush dipped in talc, and a sheet of rubber is placed upon it. These sheets and impression plates are then placed in a compact pile and submitted to gentle pressure. In due time the unvulcanized mixed sheet takes from the impression plate the print, and after it is fully set, it is ready to be cut into nipple pieces. When taken away from the pressure, the plates and mixed sheet seem to be one compact mass. They can, however, be separated, if not left too long.

The condition of the print, although primarily depending upon the condition of the impression plate, may be materially injured by careless "stripping."

The printed sheets after being stripped, if they have been stretched, are plunged into hot water, or otherwise heated, in order to shrink them, and then given to the nipple cutters. Several sheets may be cut at once if brushed lightly with talc. The die should be very sharp, as otherwise the edge of the nipple piece will be rounded, and consequently harder to knit in the making.

The nipple pieces when cut are, for small nipples, nearly heart-shaped; for large, cone-shaped. In the former the seam extends from the bottom up one side and just over the crown, the other side being seamless; while in the latter the seam completely divides the nipple. Small nipples are, therefore, made in one piece, large nipples in two pieces. To cut large nipples, two sheets are laid together with the print inside. The natural stickiness of the stock will hold these pieces together, which helps materially in the making up.

After the nipple pieces have been delivered to the makers, the next process is cementing. The pieces are neatly laid in piles, and then by means of a small brush, painted with a cement made of mixed sheet dissolved in naphtha. They are then spread upon tin plates to dry. To facilitate the drying process, each nipple table has attached to it a small steam oven so arranged that it may heat a number of tins, and yet cause little annoyance by its proximity to the makers.

The kit of tools for a nipple-maker consists of a small, slanting "case" in which are places for a certain number of nipple formers, two cement cups with brushes and "steeple tops," a small glass "naphtha well" set in the case, similar to an ink well, a naphtha brush, thumb cots for taking off nipples after being vulcanized, tin plates for drying, pans for packing, cleaning sponge, and set of nipple formers.

The small nipple formers are pear-shaped pieces of metal set upon iron pins. The large formers are simply hollow cones of metal or glass. The case has holes for small and "rests" for large formers. The rows are so arranged that their nearness to one another does not interfere with the most rapid work. By the side of each case is a rest for the tin, which is provided with a small adjustable clamp to hold it in position. Beneath this case are skeleton drawers on which are set pans of talc for packing the nipples when finished.

After the nipple pieces, placed in the oven to dry, have become thoroughly warmed, and the solvent has so evaporated as to make the cement just right to knit well, the maker takes a former, dips in in the talc, places it in the center of a piece, draws the edges together, and with a rapid pressing of the thumb nail against the two edges, closes effectually and neatly the gaping seam. The former with its half-made nipple is then returned to its place, and another former covered. In the same way the whole case is studded with pear-shaped rubber covered formers. Next in order is the making of the flange at the lower end. For this purpose the cement brush is again brought into requisition, and the lower end cemented. When dry, the operator with the right thumb presses firmly on the lower edge with an upward motion. This turns it over a little, and when continued around the stem, makes a small ring at the lower end of the nipple. A continuation of this brings out the flange. Large nipples are cemented, seamed and flanged, and then turned inside out, as they were cut with the print within.

When finished, the nipples, formers and all, are packed in shallow pans half filled with talc. The packing in itself is quite an art, as there must be economy of space, and as a quick thrust must be given to each one in order to force a little talc between the stem of the former and the nipple, to prevent the flange from adhering to the stem. When packed they are taken away to the heater, where, after being filled full of talc, the pan is loaded upon a car and run into the heater. The "chalk room," in which the nipple pans are filled, is provided with tables under which are large bins. Below the level of the table tops are a set of sieves, and into these the pans of vulcanized nipples and talc are poured and sifted, each worker keeping her "heats" separate.

Taking the nipples off from the former is oftentimes very hard work. Especially is this true of small nipples. Then it is that the "cots" come in place and save many tender fingers from blistering. But after the knack of slipping them off has been learned, it is wonderfully easier. A short

season of scouring in the cylinders is next in order, after which the nipples go to the potash boiler.

The punching of the holes in the crown of the nipple is done by hand. Small punches are set in standards at each table. The nipple is placed upon the punch, and hit firmly with a small wooden mallet. The rapidity with which many of the makers punch the nipples is surprising. For a finishing touch the girls take them again in hand, pack them in paper boxes, and the nipple is ready for market.

A curious part of the process of nipple-making, is the care the girls take of their finger-nails. These before all other tools are a necessity. If brittle, the utmost care in trimming is taken, and they are washed, scrubbed and oiled with daily solicitude. A cracked nail is a calamity, as no seaming at all can be done until it has grown to the proper length.

Black nipples after being washed frequently have a grayish dirty tinge, which is removed by dipping them in a liquid black.

Nipples, instead of always being made by hand, as in the foregoing, are frequently "dipped," that is, the former is plunged into a cement made of rubber dissolved in some solvent, and then dried. This being repeated until a suitable coating is obtained, when the flange is rolled as in other nipples. They are also made in moulds. Finger cots and other rubber articles of similar shape are cut, cemented and made over formers in the same manner as nipples.

A Few Words About Rubber Cements.

THE rubber man who does not know how to make almost any kind of elastic cement would be hard to find. Indeed there was a time when rubber itself was made up into a cement before being converted into mechanical goods, as the time of large washers, mixers and calenders had not then come. In the gossamer factories, where the "churns" are set in rows of a dozen or more, and where these iron arms are daily whirling through the sticky mixture to reduce the compounds to the right sort of coating, it is no trick to make a cement. And yet it is of cement-making in other factories that this article treats particularly—for mechanical goods, in rubber shoe factories and the like.

In the first place, let us look at what a cement must do. To begin with, where two surfaces are to be joined, the cement must be in contact with both edges or surfaces. Very frequently in rubber work, instead of using cement, the two surfaces are simply brushed over with naphtha. This softens the rubber, and when partially evaporated leaves it in nearly as favorable a condition for adhesion as if cemented.

As a rule, as little cement as possible should be left between the surfaces which are to be united, and, in addition to this, all cement should be given plenty of time to dry. Rubber surfaces that are to be joined should be brushed lightly with thin cement, and then, if practicable, laid where they are exposed to a gentle heat. This both softens the rubber and evaporates the solvent. When the surfaces can be touched with the finger without having any particle of cement adhere to it they can be joined with good results. A premature joining of material newly cemented, or even brushed with naphtha, sometimes produces both porosity and blisters. That rubber cements may well be called "quick-drying cements" can be demonstrated by a comparison with some of the "oil cements," which take from a few months to three years to solidify.

The rubber cement should always be similar to the mixed sheet upon which it is to be used. That is, it should contain the same percentage of sulphur. If care is not taken that this is so, strange results are attainable in the vulcanization. On every can, tub, pail or dipper in use in rubber factories for holding cement should be graven the ancient direction, "well shaken before taken," or let it be thoroughly understood that much defective work comes from "thick cementing" where the sulphur, etc., have settled, and the operatives will soon see that previous to every "cementing" the compound is well agitated.

Where small quantities of cement for peculiar compounds are to be made, large tin pans are usually employed, the mixed sheet being first well softened by heat, and then cut up by hand into a sufficient quantity of whatever solvent is to be used. A rapid stirring greatly facilitates the action of the solvent, but good cement needs several hours of digestion before it is fit for use. Where larger quantities are to be made, iron tubs are partly filled with the solvent, which is, in most cases, either naphtha or camphene, and the rubber is run through the "refining mill," coming out in thin sheets, which are cut off and plunged, warm as they are, into the tub of liquid, the whole mass being meanwhile rapidly stirred. The "stirring paddle" is an oar-shaped piece of hard wood bound with metal.

In large manufactories, where great quantities of cement are used, this latter way, although an improvement upon many former styles of the art of cement-making, is too slow; machinery is therefore employed to take the place of the "stirrers." A machine is in use in several places for this purpose, consisting of a huge tank, not unlike a hogshead in shape, in which revolves a wheel that looks like an inverted turbine. This, running at high speed through the conglomeration of stickiness, mixes a large quantity in a short time.

It is admitted in all manufactories where the article is used that cement is a dangerous servant. The mill owners fear it; the operatives dislike it, and the insurance agents dread it. It has, therefore, come to pass, that in most well-regulated places the mixing and stirring of cement has been done in a fire-proof building, known as the "cement-house." This may be near the factory, so as to receive the benefit of the steam power, and yet be so distant and protected as to be harmless either from sudden explosion, or fire from any other cause.

When the cement is thus stored, it, of course, makes additional work for the carriers; but in the end it pays. When the cement-house is in use it is customary for the carriers to collect all the cement throughout the establishment each night, and store it in the great tanks in the house.

When applied to small articles cement is put on with a brush, but when spread upon fabrics a broad-bladed knife is used. This knife is very heavy, and made of iron. It is hung so as to just graze the circumference of a smooth iron roller, over which the fabric must pass. On each end of the knife are adjustable "guides," which regulate the width of the coat of cement to be spread. The cement, which is quite

thick, is placed against the knife, and the cloth drawn over the roller, the dull blade scraping all but a thin coating from the cloth, the surplus rolling in a thick viscid mass over the cloth as fast as it moves.

After the coat of cement has been laid, the fabric is run over a series of steam pipes to hasten the evaporation of the solvent. This part of the work is attended with danger, for, if the cement be new, so that the solvent can strike through the cloth and reach the pipes, the whole piece will burst into flame as if it were so much gun-powder. A poor quality of naphtha will also produce these sudden flame explosions. The "cementing room" being always furnished with ready appliances for extinguishing these sudden fires, there is usually little lost beyond the cloth, and the eyelashes and eyebrows of the operatives.

Among the many cements used in rubber manufacture, one that has become famous is the marine glue. The common way of making it is, one pound of caoutchouc to one gallon of coal-tar naphtha, and twenty pounds of shellac. This is heated gently, and poured upon metal plates to solidify; when needed for use it is melted at 250° Fahrenheit. This cement is insoluble in water, and, in most cases, makes the broken place stronger than the surrounding parts. By using more naphtha the same may be obtained in liquid form.

A good gutta-percha cement may be made of two parts of common pitch, one part of gutta-percha, melted together and well stirred, then poured into cold water. The result is a hard brittle substance, which, however, softens when heated, and at 100° Fahrenheit is a thin fluid. It is said to be used sometimes instead of putty for windows. A similar cement, made of equal parts of gutta-percha and pitch, is used for joining ivory to brass or steel.

Where fine work is to be done in "dipping" or coating delicate moulds by rubber dissolved by some one of the many solvents, the following has been tried with great success: One part of pure caoutchouc to thirty parts of carbon disulphide, mixed with five per cent. of absolute alcohol. This last-named is, for beautiful results, the prince of cements, and will invariably give the fullest satisfaction.

Finish in Rubber Goods.

IN hardly any line of business is there so much temptation to slight the little touches that go to make up the finest of the goods as in the rubber business. This is in part due to the fact that the practical rubber man is always relying on the preliminaries that involve the integrity of the goods themselves, and for that reason his mind is more taken up with the producing of goods that will wear and not damage, than he is with goods that look well and have an elegant finish. To be more accurate we should say that this *was* the case, rather than is the case, for within five years there has been a rapid advancement in the particular of beautiful finish of goods of all classes. If we look back, for instance, at the white rubber bulb made five years ago we will find in many instances that it was but roughly finished. The bead on it was many times but a ragged edge of rubber raised above the surface, and the bulb was often broken by tiny warts and excresences that came from the roughly finished mould. If now we take the bulb made to-day we find, almost without exception, the bead to be smooth and beautifully turned, and the surface of the bulb as smooth as if made from glass. This finish that is now put upon the goods became a necessity as soon as the more progressive concerns began to put theirs out in this manner. In rubber clothing the same progress has been marked. Garments that but a few years since were badly fitting and smelled so strong of rubber as to be exceedingly disagreeable have been turned into tailor-made garments. They are fitted now with a care that the best cloak makers could not excel and the rubber is so carefully deodorized that its presence is not detected at all by the smell. In addition to this the beautiful cloth upon which the rubber is spread, and the elegant striping and figuring of the gum itself has made the manufacture of rubber garments nearly a work of art. Nor has the rubber shoe industry been behind in this progressive march towards perfection; old style patterns that were too cumbersome and heavy, and made no pretension of fitting any feet except those that were as broad as they were long, have been changed until, to-day, in the light weight and gossamer shoes, and even in the heavier goods the styles have become changed and the goods are such as to please the eye of the most fastidious. In mechanical goods also progress must be noted. Belting was formerly sent out looking almost any way as long as it could be proved to be strong and durable. If there were roughnesses on the face it did not matter, and if the roll was done up any way to hold together it was all right; to-day, however, the smooth and beautiful finish that is put even upon the common belting; the neatness in which it is packed and the general air of thrift that goes with each roll bespeaks the fact that taste has entered even into the matter of mechanical goods. It may be argued that the beauty and smoothness of finish and the general make up of the rubber goods do not necessarily mean that the compounds are made better, or that they will wear any longer. We claim, however, that any advance in neatness of manufacture or in the better finish will necessarily help the goods; because they must naturally be better made, and therefore the purchasers get a material advantage from this display of good taste. It is not many years since two rubber factories started in similar lines of manufacture and with practically the same amount of capital, which was very small. The head of one of these factories was a man of marked inventive ability but with no eye for beauty in finish. He designed many articles that had in them points of rare excellence, and the goods were popular to a certain extent. In the other factory was a gentleman who had less inventive ability but a wonderful faculty for turning out goods that were pleasing to the eye, and that had a beautiful finish. Within a few years the factory where the finish was made a desideratum grew far ahead of its competitor, and adding from time to time capital, machinery and various facilities for work, it became one of the most prosperous factories in the United States. Its rival, though it turned out new and improved goods and built up for a short time, finally was forced out of business. The moral is evident; people buy goods not only for their utility but fully as much for their looks.

Many Thanks, Gentlemen.

ADVERTISERS are continually looking for results from the money they spend. In many cases, while their business may increase in proportion as they advertise wisely, it is almost impossible to trace the source of this prosperity. It is, therefore, an especial gratification to one who is spending money with any paper to know absolutely that it is earning money in return. In a wide and varied experience in trade journalism we have never before seen such quick and gratifying results as have come to certain of the advertisers in THE INDIA RUBBER WORLD. Mr. Edred W. Clark, of Hartford, Conn., one of the first of our advertisers in the line of supplies and machinery for rubber factories, wrote a letter for the December issue, in which he spoke of the benefit that THE WORLD was to his business. He now writes us a second letter, in which he chronicles further results from the display of cuts and descriptions of his tubing machines.

"I have just completed two tube machines of special design, driven by spur and bevel gears instead of worm and gear, for the Davol Rubber Co., of Providence, R. I.

"I have also shipped the second tube machine to the Boston Belting Co., and have orders for several more and am very busy."

In the same strain is a letter from the Boomer & Boschert Press Co., of Syracuse, N. Y.—the second announcement of good results from our paper—which reads:

"Since writing you before we have received an order from the Hartford Rubber Works Co., Hartford, Conn., for a vulcanizing press, and we are negotiating with several others, two of which came through our ad. in INDIA RUBBER WORLD."

From the Manufacturing Agent and General Manager of the Boston Belting Co., Mr. James Bennett Forsyth, is received the following pleasant communication:

"I frequently meet prominent people, in all classes of trade, who have received or read your publication, and speak very highly of it."

It seems that the editorial in our December number, announcing the independent position that we propose to take in matters journalistic, and particularly electrical, struck a responsive chord in the breast of Mr. W. H. Buell, of the firm of W. H. Buell & Co., Marietta, Ohio. He writes:

"A specimen copy of your journal is at hand, and I write to express my approval. I turned over the copy sent me to our electrical engineer, and I have no doubt his good sense will prompt him to subscribe. . . .

"When a man of world-wide and well-deserved celebrity as an electrician lends his name in the public prints to propagating a scientific error, a journal proposing to write from the laboratory and not from the counting-house will be both unusual and invaluable."

From one of the veterans in the rubber business, the proprietor of Chamberlin's rubber store in Rochester, N. Y., comes the following greeting:

"Enclosed please find subscription to THE INDIA RUBBER WORLD, which is a most worthy publication and one which the trade has long looked for. May it be as valuable to the publishers as it is to the trade."

Of the pleasant things that have been said to us from all parts of the country St. Louis has done her part. From the Day Rubber Co. of that city comes the following:

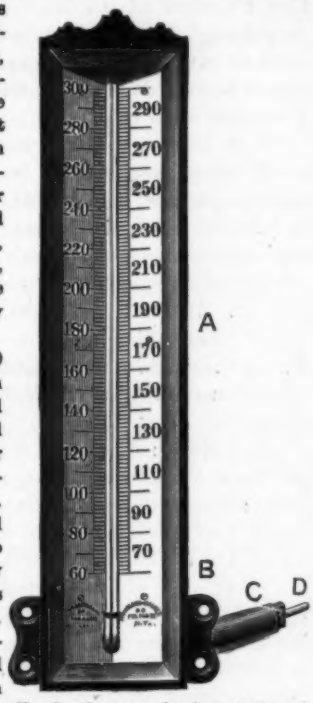
"A perusal of the first number of THE INDIA RUBBER WORLD leads us to believe that your publication will be very useful and greatly appreciated by the rubber trade."

From one whose word goes a great way in rubber matters, Mr. Geo. A. Alden of Boston, comes the following:

"You have struck the right chord, and if you continue thus you will surely make a success."

Improved Thermometers for Vulcanization.

THE most expensive instrument that can find its way into a rubber factory is a cheap or defective thermometer. What the rubber manufacturer requires for his heater is a Stationary Mercury Thermometer, of accurate, durable and practical construction, with a face or scales on the outside of heater so arranged that the metal scales cannot tarnish and that the figures and graduations are large, heavy and far apart, that the operator can read the temperature, day or night, with ease and certainty. Also, that the entire thermometer be amply protected against liability to injury.



Messrs. Hohman & Maurer, 90 Fulton St., N. Y., U. S. A., claim to make such a thermometer, and it is known as the "Standard Mercury Bath Thermometer, for Dry Heater Vulcanizing," an illustration of which is given herewith. A designates an iron V-shaped casting enclosing the scales; into this casting is cemented a heavy glass plate, which keeps the scales clean and also protects the tube. B designates the method of attaching thermometer to the wall of heater; a hole of one inch diameter is bored through the wall, the brass tube inserted and puttied, and then fastened tight with four screws. C, a heavy brass tube, which extends through the wall and in the inside of the heater. D, the steel chamber, enclosing the mercury bath and protecting the bulb from all injury, the mercury bath serving as the conducting medium of the heat from the steel to the bulb; the bulb is extremely sensitive and the steel chamber very delicate, thus serving to give instant indication on the outside.

There is not a suggestion of weakness or fragility about this thermometer. It is solid, strong, and durable; the tubing is of the finest Corning glass, drawn especially for the purpose by an experienced glass-blower; the mercury is of the purest, to avoid separations, and the methods employed in construction have been perfected after years of study and practice.

The makers have been equipping dry heaters for many years and, after much observation and experiment, feel safe in making the claim that their "Standard Mercury Bath Thermometer" is the most accurate, reliable and durable temperature indicator ever offered to manufacturers operating dry heat vulcanizers. They should like their claims put to test, and they respectfully ask all manufacturers using dry heaters to give their thermometer a thorough trial. Correspondence on the subject is invited.

Insulated Wires.

IV.—India Rubber.

BY HERBERT LAWS WEBB.

INDIA RUBBER has been used as an insulator for electrical conductors almost from the time when insulated wires first came into existence. However, gutta percha was a trifle the foremost in the field, and from the first more attention was paid to this material for the purpose of insulating underground and submarine wires than was the case with india rubber; consequently, improvements in the manufacture of the insulator for a long time were more vigorously pursued with gutta percha than with india rubber, and this naturally in the course of time has led to the practical exclusion of india rubber from the submarine cable field. That here we have a survival of the fittest there is little reason to doubt, as, although in the early days of ocean telegraphy india rubber was extensively used, experience has proved that gutta percha is more durable and altogether better suited for cable work than india rubber.

When submarine lines were first mooted, india rubber found many advocates for its use as an insulator, the most notable, perhaps, being a Mr. Charles West, who was familiarly known as "India Rubber West" because he believed that there was nothing like india rubber, and seized with avidity every possible opportunity to abuse gutta percha to his heart's content. In 1852 Mr. West constructed several miles of india rubber cable; the cable was kept coiled up in the yard during the summer and autumn of that year, and early in 1853 was submerged between Keyhaven and Hurst Castle on the Hampshire coast, England. The construction of the cable was as follows: four solid copper conductors of No. 16 B. W. G., *untinned* and unprepared were insulated each with three lappings of pure india rubber tape of narrow width. These four insulated wires were laid up helically together round a small core of yarn, and the whole was lapped with one stout piece of well-tarred yarn. This serving was laid round in one long length; the sheathing consisted of a number of iron wires *plaited* like window sash cord. Although in 1852 the manufacture of cable core was in a very rudimentary stage, with no curing process to render the lappings of rubber homogeneous then known, yet this cable lasted remarkably well, and as late as the year 1872 one wire was still working. In that year part of the cable was taken up for examination. It was found that the iron sheathing, although oxidized, still offered a strong protection; on removing the sheathing the yarn was found to be perfect, with a large quantity of tar remaining in it. The insulated wires had been considerably indented by the yarn and by the lateral pressure of one against the other; they were discolored externally by the tar, but to all appearances remaining sound, especially where they abutted against each other, seemingly in perfect preservation and unchanged in color. The insulation resistance of the pieces recovered was found to be about two megohms per mile, which would be considered very low in these days, but considering the imperfect manufacture of the cable and its length of service was an astonishingly good result. On cutting the wires and further examining them there was found a fair adhesion between the several lappings, and the india rubber had preserved not only its color but its elasticity. The copper wire was found to be perfectly clean and with a bloom on it as if it had just been manufactured.

The form of india rubber insulated wire which has been almost exclusively used for submarine cables is that generally known as Hooper's core, the process consisting of an application of a coating of vulcanizable rubber over a coating of masticated rubber with an intervening layer or "separator" of compounded rubber to arrest the passage of sulphur from the vulcanized compound to the inner layer of masticated rubber. The material for the separator is compounded with metallic oxides, red oxide of lead and oxide of zinc being those generally used in practice. A good many miles of this rubber cable have been laid down in various parts of the world; in several cases the insulation has gone down most unaccountably after laying, without any apparent reason therefor. Owing to this and many other difficulties, india rubber has been practically abandoned as an insulator for submarine cables, and the price of rubber has increased so much of late years, that at the present day, when, by reason of improved methods of manufacture and perfect knowledge of the peculiarities of the material, india rubber might compete with gutta percha with far better chances of success than formerly, such competition is practically out of the question because an india rubber cable would cost much more than one insulated with gutta percha.

The fact that india rubber has a lower inductive capacity than gutta percha brought it into prominent notice for cable work. Sir Charles Wheatstone states that a coating of india rubber of a given thickness was fully equal to a coating of gutta percha of double that thickness. It was thought by many at one time that india rubber would entirely replace gutta percha as an insulator for long lines of cable, but as we have already seen, this has not been the case, and this superiority of india rubber with respect to inductive capacity really militated against the success of the material, as manufacturers began to use smaller quantities of india rubber for insulating a wire than they had been accustomed to use of gutta percha, with a view to turning the superior electrical qualities of india rubber to advantage by economizing material. This, however, led to diminished security from mechanical faults, and although the lower inductive capacity of india rubber pointed to very important results, it really tended more in the direction of its ignominy than otherwise.

The absorption of water by insulating substances is a matter of considerable importance. In this respect india rubber yields distinctly less favorable results than gutta percha. Mr. T. Bruce Warren, the analytical chemist of the Silvertown (England) Company, has conducted some interesting experiments in this direction. After examining sheets of india rubber, gutta percha and compounds of india rubber, both vulcanized and unvulcanized, which had been immersed in sea and river water for twelve years, the general deduction is that, while some materials incorporated with india rubber retard the rate of penetration to an enormous extent, it still takes place to a degree which would render its use in water extremely undesirable. Gutta percha, and some forms of vulcanized india rubber, do not indicate any deterioration from this cause. Pure vulcanized rubber, as well as its mas-

ticated form, completely loses its insulating property after a few years. Vulcanized rubber, containing tar, oxides of zinc or lead, plumbago, lime and charcoal, are seriously affected by an immersion of from three to five years, whether in river or sea water.

Compounds of india rubber, which, when vulcanized, show an efflorescence of sulphur on their surface, when exposed to the air for a short time, absorb water very rapidly, especially if taken out after some little time and exposed to the air, then returned to the water again, and this repeated at intervals of a month or so.

It is found that gutta percha takes up from 3 to 8 per cent. of water during manufacture, while vulcanized rubber retains from 6 to 10 per cent. Consequently an Atlantic cable will contain about twelve tons of water. It is impossible to say what effect may follow from this water of hydration, which is diffused through the whole substance of the core. Looking at this in a commercial way, it is certainly a very heavy water rate, as the water all goes in at the price of the insulating material and represents a value of about $50,000. With vulcanized india rubber it would be fully equal to twice this amount.

Of the manufacture of india rubber insulated wires, but little need be said. The methods at present in use are but slight modifications of those proposed on its earliest introduction. In fact, the machine employed in lapping india rubber tapes around the copper wires, differs in no particular from that invented by Moses Poole in 1852. The first patent for applying vulcanized rubber was taken out by Mr. C. Goodyear in the latter part of the same year. The mechanical arrangements for putting india rubber on longitudinally are similar to those patented in 1848 by Messrs. Barlow and Forster. The only improvement worth mentioning is that introduced by the Silvertown Company, by which several wires can be coated at the same time. By this important improvement one machine can produce about ten miles of covered wire per day with one-twentieth part of the labor required in the ordinary way. The rubber tapes are laid on either helically or longitudinally; when the latter method is used the core is passed between two grooved wheels, with sharp edges, revolving one above the other. These cutters are movable, so as to admit of covering different sizes of wire. Guides are placed in front of the cutters, so that the tapes entering with the wires are kept in their proper positions; the portions sheared off are received in trays by the workmen. The tapes must be of equal thickness, and, as nearly as possible, equally plastic; this is obtained by uniformity in grinding and calendering, and subsequent maintenance of equal temperatures. The condition of the compound must be such, that a gentle pressure causes them to unite permanently at the recently cut edges. As in the case of gutta percha core, the most careful and experienced hands are employed in every stage of the manufacture. Every mile of wire covered in the ordinary way, requires the supervision and attention of four or five men, each of whom, by an act of omission, may produce serious faults; through the simplification of the manufacture it is now possible to employ a better and more skilled class of labor for this supervision, a great advantage in view of the difficulty formerly found in placing the responsibility for the existence of defects in the proper quarter.

India rubber is now used as an insulator for electric light cables carrying high-tension currents, and the results so far have been satisfactory. In the high class cables manufactured in England, the practice is to put next the conductor, after cotton twist, a substantial coating of pure india rubber, slightly vulcanized, upon this a coating of zinc rubber, with vulcanizing materials, and covering this a compound vulcanized rubber of great resisting qualities to moisture and gases. The zinc rubber takes up the surplus vulcanizing material of the two outer coverings, so that the copper conductor is not injured by the sulphur used in the process. Such an insulation as this is as good as could possibly be desired for any high-tension currents, and is absolutely perfect, so long as the covering is continuous; and as the whole of the materials are treated at a temperature of 400° Fahr., any rise in temperature of the conductor due to overloading will not injure the insulation. The outer protection sometimes consists of braidings of asphalted tape and sometimes of iron sheathing. These cables are in use in many places in England and other parts of Europe, working with high-tension currents, both continuous and alternating, and after a number of years' service continue to give perfect satisfaction. The cost of a cable of this description, $\frac{1}{4}$ conductors, insulated to 5,000 megohms at 60° Fahr., taped and braided over all, specially prepared for underground work, is about $1,250 per mile.

Current Gleanings.

BY LIGHTNING ARRESTER.

[N a paper on "Electrical Engineering in America," recently read by Mr. G. L. Addenbrooke before the London Institution of Electrical Engineers, the author, speaking of underground work, gave the following description of Cobb vulcanite covered wire: "As regards the class of cable which is being largely laid down in these conduits, the conductor consists of seven strands of No. 16 copper. These are insulated by a layer of a hard but somewhat flexible material, containing, I believe, some rubber in conjunction with other materials, but the complete material is cheaper than rubber used alone. The thickness of this material surrounding the conductors is one-twelfth of an inch. It somewhat resembles ebonite, and is of a consistency to stand rough usage and hard wear. It will be interesting to see how it lasts in practice. I must say, it seems to me a very suitable material for the purpose for which it is intended; and as far as insulating qualities go, I was able to see the records of tests of a good deal that has been laid, and they were excellent, going up to several thousand megohms per mile. The insulating material is covered with a lead pipe about one-sixteenth of an inch thick, and containing, I believe, a percentage of tin. The jointing is done by a special system, and when it is completed electrically the two lead pipes are drawn together over a small bit of brass tube, which protects the point of junction; they are then 'wiped' together with a hot iron, like an ordinary plumber's joint. No doubt this work is heavy and expensive, but it looks as if it should last when once put down."

* * *

A piece of the Cobb vulcanite cable was exhibited to the meeting by Mr. Addenbrooke, and considerable interest was aroused on account of the hardness of the insulation.

* * *

One gentleman, who took part in the discussion on this paper, said that he could not agree with the author in his condemnation of arc lamps fixed on poles on account of their glaring character, and

added that the tower system had been almost abandoned in New York in favor of poles. He greatly preferred the blaze of light in that city to the comparative darkness of London. I wonder what he would think of the "blaze of light" in which New York is flourishing just now. Even the "comparative darkness" of London would be preferable to the almost total gloom in which the authorities have caused New York to be shrouded.

* * *

The last meeting of the Board of Electrical Control was characterized by the same delightfully harmonious proceedings in which the Mayor and the "negligent and incompetent" Commissioners have indulged for some time past. The Mayor refused to vote for the adoption of various long-winded reports, and even refused to listen to the reading of them. He told the members and officials of the Board that their work was not done properly, and scored a point when he called for a map, which was not forthcoming as it ought to have been, in order to substantiate a certain report. However, the Commissioners said they knew how the work ought to be done and when maps could be called for and when not, and the stolid Hess and the pugnacious Gibbens adopted all the reports in spite of the Mayor.

* * *

Two of those inventors who crop up every now and then and are going to astonish the world by the marvels which they intend to perform with the aid of electricity, are just now on the war-path. One of these gentlemen is a native of New Jersey, and he has made a discovery, the development of which will accomplish nothing more or less than the abolition of war. The scheme is to produce artificial lightning. Already this investigator has succeeded, by means of a small dynamo attached to his invention, in killing the flies in a 20x20 room. With the use of powerful dynamos a flash can be directed against an army a mile or more away without injury to the party operating the gun; thousands of soldiers can be killed at a flash, and a number of flashes are enough to destroy an army. The device can be used at any time except on damp or rainy days. It is curious that a man capable of inventing such a wonderful contrivance as this should be so weak-minded as to address such a query as the following to the editor of a daily paper: "Before going any further with it I would ask your opinion as to the effect upon war of an instrument such as I have hinted at. Would it retard or facilitate war?"

* * *

Just imagine what a remarkable turn the war correspondence of our daily papers will take when this deadly "flasher" comes into general use. Dispatches will read something like this: "The morning broke bright and clear, and flashing commenced at an early hour. Our flashing corps experienced some difficulty at first in determining the enemy's range, and several of our finest regiments were entirely annihilated in rapid succession. However, in a short time, the weather changed, heavy rain commencing to fall, and flashing had to be abandoned; a general advance was ordered, the enemy retreating in confusion. On overtaking the flying masses of men, our cavalry regiments were surprised to find that they were totally unarmed, but the troopers were so enraged at the wholesale destruction of their comrades, that no quarter was given, and a most horrible and reckless slaughter ensued. No more terrible battle has been fought in the whole course of history. It appears that the enemy went into the field unarmed because the weather forecast had confidently predicted a continuance of dry, clear weather; the retreat was so sudden that the men never thought of their arms, but were completely panic-stricken, a general *sauve qui peut* being the result."

* * *

The other enterprising revolutionizer of present-day methods, is a Russian, and his invention consists of a submarine boat which is to attain the remarkable speed of 100 nautical miles an hour. The boat is an application of the spiral principal which was suggested to Mr. Apostoloff, by watching the natives of a far-off district of Russia drag for objects lying at the bottom of a river. The *modus operandi* was to coil a rope around a large log, making one end fast to the log; to the other end was attached an iron claw. On giving the log a twirl the rope unwound, and the claw went to the bottom where it clutched any thing clutchable, a reverse turn of the log wound up the rope again and brought the claw to the surface. Sometimes very heavy stones were grappled in this way. Mr. Apostoloff pondered over this and struck the idea of applying the same principle to navigation. His boat is to be an oblong shell pointed at both ends, which is to revolve with great rapidity. Inside, fastened securely to the beam running through it, is an inner shell, cabin, etc., which remains absolutely steady, as if on land. The motive force is a secret (the vital points of these wonderful inventions generally *are* secret); it is to be supplied by an electric motor, discovered by Mr. Apostoloff, but which, unfortunately, he cannot patent. This motor will also supply the light, and every $100 worth of coal used by ordinary steamers, will be replaced by $6 worth of the inventor's "new motive force." Mr. Apostoloff promises to make the voyage between the old world and the new in twenty-six hours.

* * *

It seems rather hard on Mr. Apostoloff that he cannot patent his electric motor which is to accomplish such marvels. So many people nowadays patent inventions which they never have discovered, that it seems the very acme of ill luck to discover an improvement (and such an improvement) which cannot be patented. One idea occurs to me in connection with the proposed boat: If, by any accident, the inner shell should become connected with the outer one in such a manner, that instead of remaining "absolutely steady as on land," it were to be whirled around at the same rate, and with the same "spiral action" as the outer shell, the passengers would be placed in a very awkward predicament, or as Bret Harte would say, "the subsequent proceedings interested them no more."

* * *

An electric brake, designed by Prof. Forbes and Mr. Illius A. Timmis, has been tried in England with marked success. The brake acts on a thick iron disc, several inches in depth, bolted to the inner face of the wheel. Opposite this is another which encircles the axle loosely, and is fixed so that it cannot revolve with the wheel. This second is arranged as an electro-magnet with a powerful coil, and on making the circuit it is attracted to the wheel plate, arresting its motion, and so acting as a brake. The chief gain is in point of rapidity of action. A train of average length will feel the brake power throughout its whole length almost instantaneously, as against three or four seconds required by vacuum brakes. In one of the trials a car, slipped whilst running at the rate of 42 miles an hour, was brought to a standstill in 150 yards; another time, the car was slipped at thirty miles an hour, and brought up in sixty yards. No jarring was felt by the occupants of the car, which is one of the great advantages claimed for the new brake, and is attributable probably to the fact that the brake is in no way connected with the body of the car, the magnetic discs being kept in position by stays running from one to the other.

—A small jar of resin was not long since submitted to Mr. E. M. Holmes for identification, it having been disinterred from a heap of rubbish found among the ruins of Naucratis, and dates from the sixth century, B. C. Naucratis was at this time the only Greek colony in Egypt, and it was through this town alone that trade with Greece was permitted. Mr. Holmes states that the jar contained Chian turpentine. According to Fluckiger, there is no evidence that the old Egyptians were acquainted with the resin, and this discovery carries the history of the commerce of the drug two hundred years further back. Another resin was found on a mummy cloth on the body of a person of apparent rank. It was found in Hawara Cemetery, in the Fayum province of Lower Egypt, and dates from a period not earlier than the second century, A. D. Examination seemed to indicate that it must be a Siamese benzoin. The authors of "Pharmacographia" state that there is no evidence that Greek, Roman, or even early Arabian physicians had any acquaintance with benzoin.—*Phar. Jour.*

Desirable Improvements in Steam Fire Engines.

BY ROBERT GRIMSHAW.

THE steam fire engine as it is does more work and better work for its size than almost any other class of machinery, other than instruments of precision; but it is a long way from perfection, and its importance warrants its being given much more thought and attention than inventors and manufacturers are willing to accord it.

There is room for smart practical inventors and improvers to step in and make of a wonderful piece of machinery, something that will be even more marvelous and useful.

One of the first things which should be done is the reduction of the weight. This does not call for much change in principle or design; only in methods of construction. If boilers are made of mild steel only, and welded hydraulically so as to be absolutely seamless, their weight might be reduced twenty-five per cent., to the benefit of all concerned.

As for the grate, I think that its weight should be taken entirely away, for coal and wood should not be used any longer as fuel.

Crude oil, or even ordinary petroleum, is so readily controlled and gives such a strong regular fire with so little attendance that its use should be imperative. That will do away with the coal bunkers and with a great deal of their weight. But the main object of the change in fuel is strength and regularity of combustion. Every one knows how liable fresh fuel is to chill the fire and lower steam just at the time when most power is needed; and the smoke from coal or wood is a disadvantage, only equaled by that of the flying sparks, which cause a very large number of new fires.

As for the wheels, they are as good as could be expected considering what is demanded of them. We will let them alone for the present.

The steam cylinders will bear considerable improvement. They are very wasteful of steam. Makers of 6x10 and 9x12 stationary engines are commencing to do better than use the ordinary plain D valve with cut-off at $\frac{3}{4}$, and there is no reason why the steam fire engine should not have better valves and valve motions than the stationary of the same cylinder capacity. A riding cut-off valve permitting of running the cut-off back to $\frac{1}{4}$ without throttling, would be a great benefit, and would add but little to the weight, cost and complication of the machine. Such a valve would cut-off as late as $\frac{3}{4}$ with the main valve if desired, and the position of the riding plates could be altered by hand while the engine was running so that they would cut-off clear back to zero if wished. With such valves, cutting off with their inner edges, the engineer could control his engine without the throttle, which should never be used except when the engine was started up or shut down.

A little more fly-wheel would not hurt many of the engines on the market, particularly if it was of large diameter. A small amount of metal a good way off from the centre would wonderfully increase the steadiness of the engine without the weight being anything of a pull.

There is need of a little better balancing of the connecting-rod and other reciprocating parts. On vertical engines the cut-off should be so adjusted as to make allowance for the smaller effective area of the front end of the steam piston, and to take care of the weight of both the steam and the water pistons and their common rod.

The pistons themselves deserve considerable attention, as does the cylinder bore. This should be carefully examined to see it is kept in good condition—that is, round, straight, parallel and smooth. Horizontal cylinders are apt to get out of round, and both they and vertical ones get "hour-glassed" and scratched, besides being pitted by the action of animal lubricants which have been improperly refined by acids. Once a cylinder is hour-glassed it will, if packed tight enough to be tight when the piston is at stroke end, have an undue amount of friction; and if it is packed so as to be just snug when the piston is in the centre, it will leak steam at each stroke end, just where the pressure is the greatest.

If the piston is steam packed there will be a tendency to hour-glassing. If it is spring packed there is danger lest it be over-packed, thus increasing the wear all along.

The rods are very often ringed, or fluted, and this is generally caused by being packed too tight; and once they are spoiled by tight packing, they will have to be packed still tighter to keep them from leaking; thus unduly increasing the friction. If they are packed too loosely then steam or water blows through; and this is not desirable. Many a rod has been scored by the packing having been laid down somewhere where there was sharp dirt, particularly if there were cinders about. A little speck of cinder, almost invisible to the naked eye, will scratch a rod the full stroke length and start a very nice groove. As a rough groove is more readily pitted than a smooth surface, this trouble is increased from time to time. Jouncing over crossings on badly paved streets is apt to spring rods so that it is almost impossible to pack them anyway.

Horizontal engines should have the piston turned from time to time in order to equalize the piston wear. The cylinder wear cannot very well be equalized. Some makers of horizontal stationary engines pack their piston heads so that the pressure comes mostly upon the top, which the head has a tendency to leave.

The guides are not lined up as often as they should be in an engine so liable to be sprung as is a steam fire engine. They should be tested to see that they are straight, parallel and central. The slides are seldom long enough; and as the same one gets most of the pressure on both the out and the back stroke, no matter which way the engine runs, the oil is apt to be squeezed out from between the slide and the guide, so that where there is most pressure and most need of lubricants, there is least lubrication.

In the pump cylinder, packing rings are generally a nuisance. The best pistons of which I know are water-packed. (I am not going into the question of piston versus plunger at this time and place).

In about two engines out of three there is not enough area to the suction valves. There is not much difficulty in forcing water out of a small hole at 300 pounds to the square inch, but when it comes to only 14.7 as a possible theoretical maximum, the water does not get much show at getting in; and it should have all the area that can be spared out. There are many pumps which have 32 valves, of which 16 are for suction

and 16 for discharge. A number of years ago I persuaded the late R. J. Gould to change his pumps so that there would be 5 sets of 4 valves each for suction and 3 for discharge, and it was a success. I am not sure that it would not be better to have 6 sets for suction and only 2 for discharge.

The suction inlet and hose are not large enough in nine cases out of ten; nor is there sufficient suction air-chamber. You cannot drive water out steadily unless you get it in so. The discharge air-chamber is well enough in most engines; but care must be taken to see that it is kept full of air. There is a great tendency of water to absorb air when both are together under pressure; and in those pumps which have pear-shaped air-chambers there is plenty of surface from which the water can take up the air.

I believe that I have said about enough for a start, to convince anyone that there is need for improvement in steam fire engines.

"Celluloid"—'Zylonite."

ORIGIN, MANUFACTURE AND USES OF PYROXYLINE COMPOUNDS.

By Jules C. Desbarres, *Bachelier ès Sciences.*

SINCE "White Hard Rubber," the great desideratum of the caoutchouc worker, is thus far *non est*, and as ivory is, in quantity, getting "beautifully less," we are for the present compelled to turn to pyroxyline for a substance which can be made hard and white, and which is adapted to moulding and turning in all forms required by the trades.

Pyroxyline (Gr., *pyr, pyros*, fire ; *xylon*, wood), or gun cotton, is cellulose or vegetable fibrine treated with sulphuric and nitric acids, and afterwards subjected to a drying process.

Alexander Parks, of the india rubber manufacturing firm of Charles Macintosh & Co., was the first to make a useful application of pyroxyline. He began his experiments with gun-cotton in 1854, and, during the following year, obtained a patent for "a solution of gun-cotton alone, or with gum resins that will set transparent with it or with colours . . . . the collodion substances being rendered less inflammable by adding either phosphate of ammonia and magnesia, iodide of cadmium, per-iodide of mercury, oxalate of lime, talc, alum, etc." In the same year, 1855, a second English patent was awarded him for a solution of pyroxyline, mixed with other products, which, after the evaporation of the solvent, left a substance possessing the qualities of ivory or of horn, and which could be easily moulded or worked and receive any desired color. Samples of this substance were exhibited at the 1862 London Exposition.

In the year 1864, Parkes was granted an English patent for the process of dissolving gun-cotton to a pasty mass in wood naptha (one gallon), distilled from fused chloride of calcium (two to six pounds), and uniting the substance with *ballata gum*. The latter was "mixed with chloride of sulphur, usually not more of the chloride than five per cent., first diluting the chloride with an equal bulk or more of mineral naptha or bisulphide of carbon, to prevent too violent an action." It was not, however, until 1865 that Parkes obtained the substance which afterwards became so widely known, under the name of *Parkesine* given it at the Paris Exposition of 1867, where it obtained a silver prize medal. He dissolved pyroxyline in liquid solvents like nitro benzole, aniline, mineral naptha, wood naptha, and glacial acetic acid, driving off the solvent by evaporation or precipitating the gun-cotton out of the solution as a semi-solid curdy mass, which was then pressed and dried. Nitro benzole and anilines being likewise solvents of *india rubber and of gutta percha*, he made a good and easily adapted insulating material for telegraphic wire by compounding the *caoutchouc* or *gutta percha*, softened by the solvent with an equal quantity of pyroxyline. Parkes subsequently adopted the use of an alcoholic solution of camphor for the solvent, having many years before introduced the process of passing sulphurous acid gas over granulated camphor to produce a liquid solvent for *caoutchouc, gutta percha* and other similar products. His application of camphor in varying proportions of from ten to fifty parts with alcohol produced the most beautiful colors in a transparent substance, as well as in opaque or solid masses, imitating amber, malachite and other natural products ; it was a beautiful and solid substance, very strong, which could be moulded and turned in a lathe or rolled into sheets.

Three years later, in 1868, the Parkesine Company was organized in London for the manufacture of the new product, and was in time succeeded by the British Xylonite Company, which latter subsequently entered into a contract with the firm of J. Russell & Co., of Greenfield, Mass. (now J. Russell Cutlery Company, Turner's Falls, Mass.), to furnish them every week with at least twelve hundred pounds of the material during an entire year. Under this agreement, over seventy thousand pounds were delivered, and shipments continued to be made to this country until the rate of duty was such as to render further business prohibitory.

Parkes abandoned the manufacture in consequence of the many difficulties and risks attending it, notwithstanding the fact of his having obtained prominent awards for his processes at the London and Paris International Exhibitions of 1862 and 1867.

In 1869, Daniel Spill, of Hackney, England, was granted patents for the use of "camphor, or camphor oil, or mixtures of the same, in conjunction with alcohol or spirits of wine, the same to be employed in equal proportions," for the purpose of dissolving xyloidine (pyroxyline) and forming a product which he called "Zylonite." Spill made use of moulds and dies, as well as of heat and pressure, exactly as Parkes had done, in 1865, for the production of his Parkesine.

Daniel Spill was besides granted patents in this country and in England for a plastic compound produced by combining gums, resins, or gum resins, with camphor or with *caoutchouc* and camphor, or with balsams, or fatty or volatile oils. To use his own words, the compound consisted in "the admixture of xyloidine with animal, fish, vegetable or mineral oils, oxidized or otherwise, such, for example, as vegetable or mineral tar, lard oil, cod-liver oil, linseed oil or heavy coal oils, or with mixtures of the same, together with the admixture of other ingredients, such as paraffine, camphor, resins, fat, wax, *india rubber, gutta percha, or balleata gum*, or mixtures of the same, so as to produce a material or materials which may be employed either

alone or in conjunction with pigments, or other inert bodies, for the production of a compound which may be applied for useful purposes in the arts, such as for moulding into forms or for rolling into sheets, or otherwise, for spreading either upon or between fabrics, or otherwise, or for the coating of metals and wood."

During the month of July, 1870, John W. Hyatt, Jr., and Isaiah S. Hyatt obtained an American patent for dissolving pyroxyline in melted camphor. The camphor was comminuted by being pounded or rolled, or ground under water, and it was incorporated with pyroxyline pulp in about the proportion of one part by weight of camphor to two parts by weight of the pyroxyline. The mass was then treated to from 150 to 300 degrees Fahrenheit, and subjected to powerful pressure.

The above-named process was, however, practiced but a short time by the Hyatts, who subsequently began the use of a mixture of pyroxyline in equal parts of camphor and alcohol. The resulting product was called celluloid.

Alluding to this process, Mr. J. H. Thompson, A.M., M.D., of Washington, D. C., in the report on his department of the 1876 Exhibition, says: "This is essentially a mixture of camphor-gum finely comminuted with cellulose fibre. Being naturally colorless, it can be readily colored of any desired tint. It is strong, light, plastic under heat, and elastic when cold. It can be remolded frequently without injury and can be repaired easily and promptly through its perfect welding properties. It is now in extensive use as a *substitute for rubber*. The principal objection made by its opponents is on account of its highly inflammable nature."

The brothers Hyatt were likewise awarded patents March 28, 1871, for the manufacture of dental plates of pyroxyline dissolved in camphor by means of heat, and then molded to form while in a plastic state, and they also patented, November 19, 1872, a process and apparatus for manufacturing celluloid as follows: "A mixture of pyroxyline and gum-camphor is made into cakes, afterwards pressed in a pile with alternating layers of bibluous paper, for the purpose of absorbing excessive moisture, and the combined materials are acted upon by a plunger in a heated cylinder, dissolved, and discharged at a nozzle in a continuous rod or sheet. Two years later, October 27, 1874, they obtained what was called "imitation ivory" by combining ivory or bone-dust, pyroxyline, powdered camphor and nitric ether. This product, however, showed no "grain," and it was left for Mr. Jarvis B. Edson, the consulting engineer and builder of the works of the American Zylonite Co., at Zylonite, Mass., to bring forth, nine years later, patented processes for making "artificial ivory" in perfect imitation of the natural article. In fact, so clever was the resemblance to natural unbleached ivory that the difference could only be detected by the most careful scrutiny.

Incidentally, it may be said that William Murtar MacCartney employed the agency of camphor and patented, in April, 1870, a process "for utilizing *waste vulcanized or ebonized india rubber*, as well as for dissolving the crude material." By his method the material is first immersed in any desired solvent until it can readily be ground into small pieces, and it is then placed in a still with variable proportions of "camphor, or any of its allied substances, such as artificial camphor, camphine, camphin, oil of camphor, camphoric acid, camphrone, camphol, campholic acid or any of the camphorates, or camphoric ethers." Heat is applied and the contents of the still kept in agitation, when the material will be dissolved and the solvent passed over either in vacuo or under pressure of the atmosphere. If all the camphor is to be exhausted from the *india rubber*, alcohol is added to the hot solution.

Colors in Hard Rubber.

EVER since the discovery of hard rubber, experimentors have been at work trying to make beautiful colors in vulcanite. They have succeeded to an extent, but are still very far from the desired quality. Especially is this true in the matter of dental vulcanite. The old compound for artificial tooth plates of hard rubber was simply rubber, sulphur, and vermillion, and it produced the varying qualities of reds which were about as much like the human gums and the roof of one's mouth in color as they were like the other side of the moon. The indefatigable experimentors, however, in time succeeded in modifying these colors until beautiful pinks, light reds, maroons, and browns have been made, some of the pinks running almost up to white. Of this latter class of goods, the stock is very brittle because the rubber is necessarily heavily loaded with pigments to bring out the color and to overcome the blackening effects of the sulphur. At the present time there is a decided call for a dental vulcanite that shall be a closer imitation of the natural gum.

A very good counterfeit of the human gum is made by the dental manufactories of porcelain, compounded with an alloy of tin and gold. This, however, is expensive and were it possible for any rubber man to imitate it closely in hard rubber, his fortune is made. As a prominent manufacturer in dental goods stated recently, it would be worth a million dollars to him.

In order to copy the gum one must bear in mind exactly the appearance that it has to the ordinary observer, which is not an even red, but rather a whitish centre with reddish pink edges. An Englishman has approximated this color by taking sheets of vulcanized gum in three different colors; white, red and maroon, sticking them together, then cutting them in strips, laying them together again and then cutting them again; repeating this process seven times, by which he has so interwoven the various colors that the general effect is a whitish pink, which comes very close to the natural gum color. It is, however, far behind what nature has done or what can be done with porcelain. There is no doubt but that this problem will be successfully solved by some bright rubber man in the near future, and whether he be English or American, the discovery will be hailed with delight by not only the manufacturers of dental goods, but by the thousands of wearers of false teeth who are not anxious to have their secret known.

—Jas. Boyd & Bro., of Philadelphia, send, with a wish for our happiness and prosperity for 1890, a very pretty glass paper weight, in the upper face of which is a calendar. It lies upon the editorial desk, and is a very pleasant reminder of our friends in the Quaker City rubber trade.

Review of the Markets.

THE apprehension concerning the concession granted to a private corporation by the Provincial government of Para, which was duly chronicled in our last issue, has in large measure disappeared. When first announced it seemed to portend a fixed determination on the part of the government to form a close monopoly of the rubber market, and to advance prices to very high figures. But it turns out that all such predictions were magnified and industriously used by interested holders. The concession of ½ of a cent per pound has indeed been granted to Vianna, but that is scarcely sufficient to offset the advantage which high credit has always given to the American and English purchasers and exporters, and it is by no means sufficient to enable him to advance prices and control the market, as he pretends, for in spite of the concession, the market has thus far stubbornly refused to advance.

It is probable, however, that the effort to advance prices abnormally would have succeeded in a measure but for the prolonged spell of mild weather, and the consequent light demands for supplies from the manufacturers. Statistically, the market is strong, stocks being comparatively light at all points. But the range of prices, before as well as since the concession was granted, is high enough to be in entire keeping with this strong statistical position; and being very high, it will require something unusual to force them yet higher. We have, therefore, to report a dull market, with prices ruling steady to firm.

In gutta percha, the loss during the month of the steamer *Giwanggan*, with 75 tons, or about 1,100 baskets on board, has stimulated prices to a yet higher range than was already induced by the unprecedented demands of the cable companies. On the 13th inst., a considerable sale of fine grade stock was effected in this market at $1.50. Other prices are in keeping with this figure.

We quote as follows:

Para, fine	72-73	Loando, Niggers	58-60
Para, coarse	54-55	Sierra Leone	36-45
Caucho (Peruvian) strip	47	Benguela	49-50
Caucho (Peruvian) ball	56	Congo	40-42
Mangabeira, sheet	45-47	Small Ball	40
Esmeralda, sausage	54-55	Large Ball	41
Esmeralda, strip	52-53	Soft Ball	30
Guayaquil, strip	43-44	Flake, Lump and Ord	26-27½
Panama, strip	38-49	Mozambique, spindles	45½-46
Virgin Scrap	58-60	Mozambique, red ball	52-53
Carthagena, strip	25-29	Mozambique, white ball	42
Nicaragua, scrap	52-53½	Madagascar, pinky	61-62
Nicaragua, sheet	51	Madagascar, black	48-49
Mexican, scrap	53	Borneo	36-46
Mexican, sheet	46-50	Gutta percha, fine grade	1.50
Guatemala, sheet	45-47	Gutta percha, medium	90-1.00
Thimbles	42-43½	Gutta percha, hard white	93
Tongues	36-38	Gutta percha, lower sorts	80

STATISTICS OF PARA RUBBER, NEW YORK, DECEMBER 31ST, 1889.

Stock of Para here,	November	30th, about		700,000	lbs.
Receipts	"	"	December	"	1,846,000 "
Deliveries	"	"	"	"	1,771,000 "
Stock	"	"	December 31st,	"	775,000 "

MESSRS. SIMPSON & BEERS say of the Money Market: There has been a very limited demand for commercial paper in the rubber line, on account of the continued scarcity of money and the great demand for it. First-class single and double name rubber paper has been placed to a moderate extent at from 6 to 7 per cent., running mostly from three to five months. The supply of this class of paper is not large, and a few of our banks would readily absorb most of it, were they prepared to buy. The inflow of currency to New York from the South and West usually begins about December 1st, but this season it is uncommonly late; in fact, there is no perceptible gain yet. Certain of our financial institutions have rendered themselves very unpopular by the exorbitant rates they have charged for money for the two weeks past—in some instances from 12 to 40 per cent. having been exacted. This uncalled-for manipulation is anything but creditable, and has elicited much severe comment.

This period of extreme monied stringency is disappearing, and the prospect is for a steady 6 to 6½ per cent. market until next April. The January disbursements of one hundred millions or more, coupled with the return of currency from the interior, will materially ease our market.

Free Want Department.

Manufacturers in need of Managers, Superintendents, Foremen and help generally, are invited to make free use of this Department; and all persons seeking situations in the rubber or electrical trades, are cordially invited to do likewise. Advertisements of Machinery and Supplies Wanted will also be inserted free of charge. And, in all cases, if the first insertion of the advertisement does not accomplish the desired end, its repetition is desired by us.

WANTED—By a man thoroughly posted in the manufacture of rubber boots and shoes, clothing, etc., a position as foreman of mixing and calendering. Best of references as to ability and success in the past. Address "B," INDIA RUBBER WORLD.

WANTED—In a large manufactory of mechanical rubber goods a man as assistant superintendent, who has experience and lots of push. Must be a worker from the word "go," and will secure pay accordingly. Address "B. A," INDIA RUBBER WORLD.

WANTED—Situation by an engineer who understands the setting of rubber machinery, piping, etc., and has been accustomed to all sorts of jobbing about a rubber mill. Good references. Address "G," INDIA RUBBER WORLD.

FOR SALE—Vulcanizer almost new, 4x12 feet; cost, $300; price, $150. Address "D," INDIA RUBBER WORLD.

FOR SALE—Several second-hand mixing mills. All in good order. Prices, etc., on application. Address "N. E," INDIA RUBBER WORLD.

WANTED TO PURCHASE—Publications, treatises, law reports, etc., in any language upon India Rubber, Gutta Percha and allied products. Address, DOCTOR, 114 *Tribune* Building, New York.

FOR SALE—One steel vulcanizer, 5x13. Address "P. O. Box 297," New York.

FOR SALE—Seven 72-Carrier Braiding Machines. Address "P. O. Box 297," New York.

WANTED—A position by a thoroughly competent young lady stenographer, who has had two years' experience and can furnish best references. Address C. MORGAN, care of Rubber Works, Akron, Ohio.

WANTED—By a young American who is thoroughly posted in the manufacture of either hand or machine-made tubing, also round or square piston packing, a position in a factory where this knowledge will be useful. Address "J. D. M.," INDIA RUBBER WORLD.

WANTED—By a young man from New Brunswick who has been working in a Druggist Sundry Factory for six years on tubing and general work, a position after the 1st of January on work of that nature. Address "E. B. L.," INDIA RUBBER WORLD.

WANTED—By a young American man a skillful cutter, twenty-five years old, a hustler at work, a position in cutting-room either first or second in charge. Address "M. L. T.," INDIA RUBBER WORLD.

WANTED—By an expert rubber boot or shoe-maker who is at present employed in one of the best factories in the country, the charge of a shoe or boot room. Address "W. L. G.," INDIA RUBBER WORLD.

WANTED—By a young man who is a skillful hand at running oil-cloth calender and flocking goods, but who wishes to become equally skillful on rubber calendering, a position. Place desired rather than pay; is not out of a job, but is ambitious to reach a higher plane of work. Address "L. W. F.," INDIA RUBBER WORLD.

WANTED—Specialty or novelty to handle to the trade. Druggists, Stationers or Physicians; References. Address H. BUNLEY, 151 Griswold street, Detroit, Mich.

WANTED—First-class traveling men, fully experienced in the rubber trade in all its phases, also leather belting. Address, with reference, stating experience and with what firms, OMAHA RUBBER CO., Omaha, Neb.

WANTED—First-class salesman to travel for large manufacturing company with full line rubber boots, shoes, clothing, gossamers, etc. Address "P.," INDIA RUBBER WORLD.

WANTED—A good second-hand vulcanizer, about 3x6, cheap. Also tubing machine and small press. Must be low priced. Address H., RUBBER WORLD.

FOR SALE—A small rubber manufacturing plant centrally located in New York City, and well fitted for Hard and Soft Rubber Mould Work. Will be sold to a prompt purchaser on very easy terms. Address STOCKTON, care this office.

WANTED TO PURCHASE—A sixty-six inch three-roll calender. Must be in first-class condition for nice work. Address "S. P. Q. R.," India Rubber World Office.

WANTED—I would like to hear from a first-class Rubber Mfg. Co. in want of A1 salesman for New York State. Address "C. P.," Rubber World.

SELLING AGENT will represent manufacturers in N. Y. City and vicinity. Sell Druggists and Stationers. For particulars, please address "B. H. S.," Rubber World Office, New York.

WANTED—A mechanical rubber goods salesman with a good trade is open for an engagement. Address SALESMAN, care of India Rubber World.

WANTED—By an American, posted in the manufacture of Hard Rubber Goods, a position as Superintendent or Foreman, fully understands mixing and calendering. Fourteen years' experience. Best of reference. Address "M. L. M.," No. 1611 North Salina St., Syracuse, N. Y.

FOR SALE—Twenty tons unvulcanized boot and shoe scrap. Compounds extra good. Address "Q.," India Rubber World.

The Boston Rubber Shoe Company--See Page xxii.